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Lyons et al.

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(54) **THIN CHAMBER BURNER**

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(73) Assignee: **HNI Technologies Inc.**, Muscatine, IA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1009 days.

(21) Appl. No.: **13/396,363**

(22) Filed: **Feb. 14, 2012**

(65) **Prior Publication Data**

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Related U.S. Application Data

(63) Continuation of application No. 13/257,239, filed as application No. PCT/US2010/025235 on Feb. 24, 2010, application No. 13/396,363, which is a continuation-in-part of application No. 12/405,842, filed on Mar. 17, 2009, now Pat. No. 8,147,240.

(51) **Int. Cl.**

F24B 1/191	(2006.01)
F23D 14/84	(2006.01)
F23D 14/58	(2006.01)
F24C 3/08	(2006.01)
F24C 15/00	(2006.01)

(52) **U.S. Cl.**

CPC ***F23D 14/84*** (2013.01); ***F23D 14/586*** (2013.01); ***F24C 3/082*** (2013.01); ***F24C 15/004*** (2013.01); *F23D 2203/108* (2013.01); *F23D 2212/00* (2013.01); *F23D 2212/10* (2013.01); *F23D 2213/00* (2013.01); *F23D 2900/21004* (2013.01); *Y10T 29/49348* (2015.01); *Y10T 29/53* (2015.01)

(58) **Field of Classification Search**

CPC .. F23D 14/586; F23D 14/84; F23D 2203/108; F23D 2212/00; F23D 2212/10; F23D 2900/21004; F23D 2213/00; F24C 15/002; F24C 15/004; F24C 3/004; F24C 3/082; Y10T 29/53; Y10T 29/49348

USPC 431/125, 350, 351, 354; 126/500, 512

See application file for complete search history.

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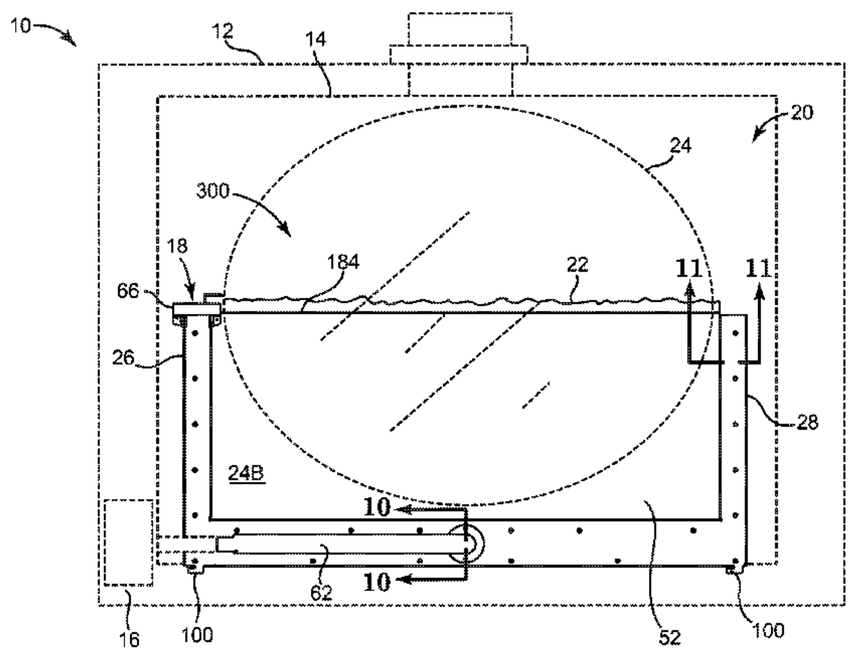
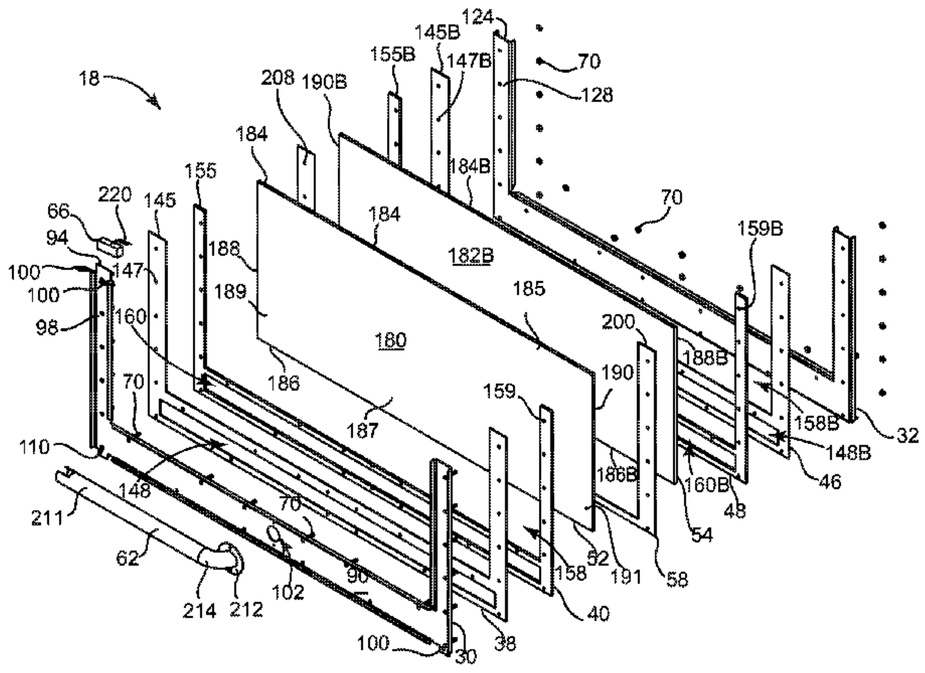
(57) **ABSTRACT**

Burner assemblies including panels (e.g., transparent panels) supported in a substantially parallel, closely-spaced relationship and gaskets and spacers sealing the space between the panels to form a perimeter seal and to define a plenum between the first and second panels with an inlet into the plenum and an outlet out of the plenum.

21 Claims, 19 Drawing Sheets





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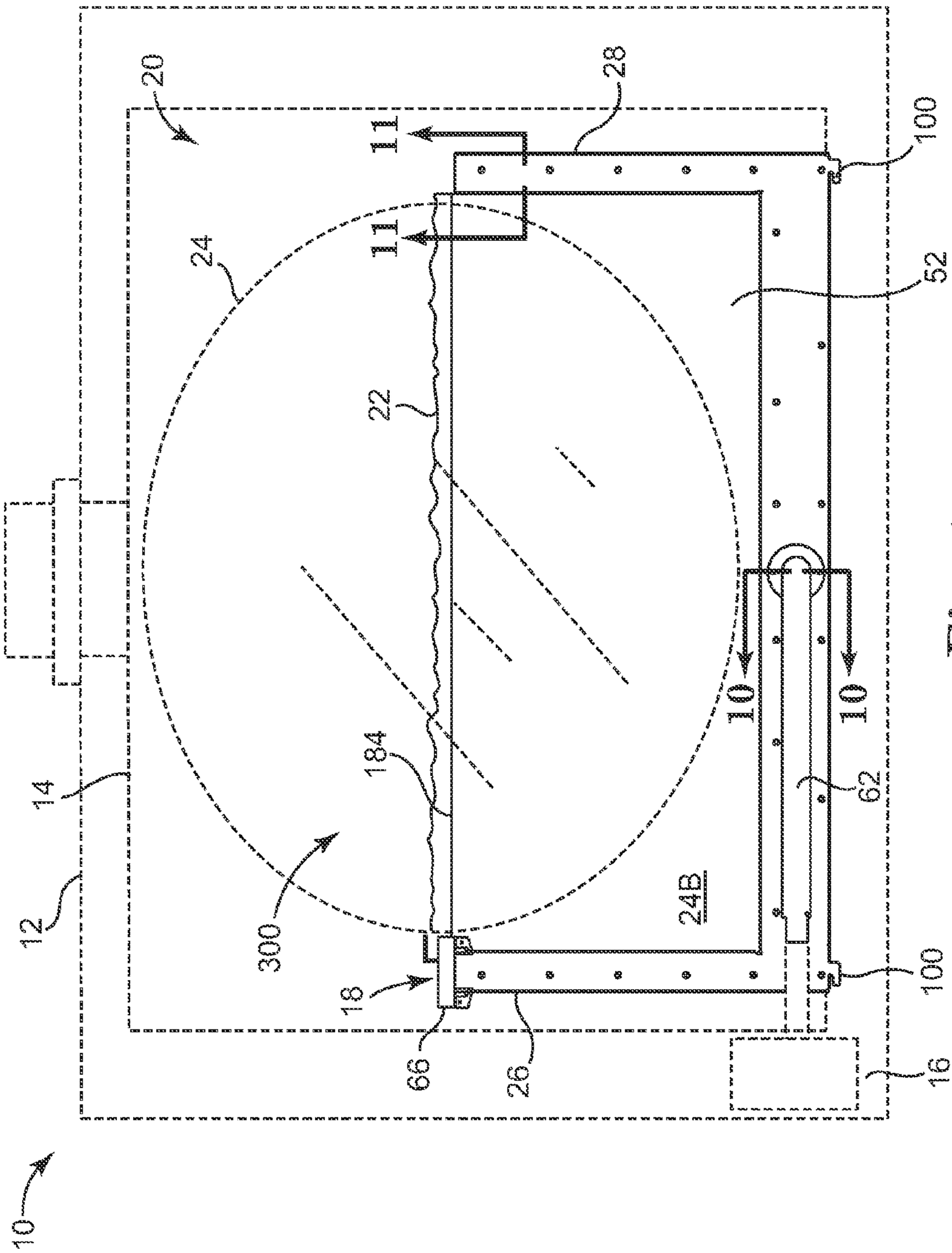

Fig. 1

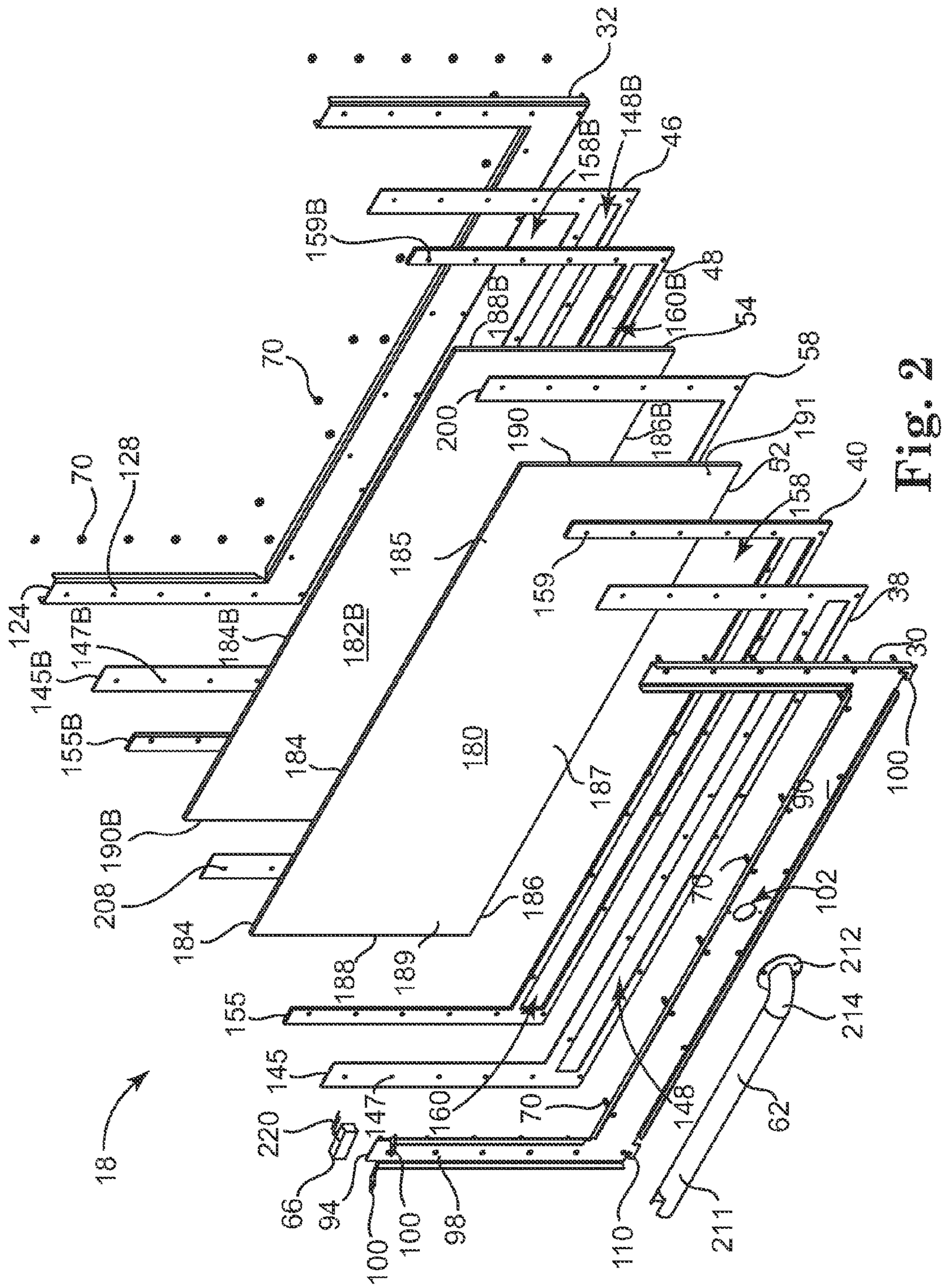
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Fig. 2

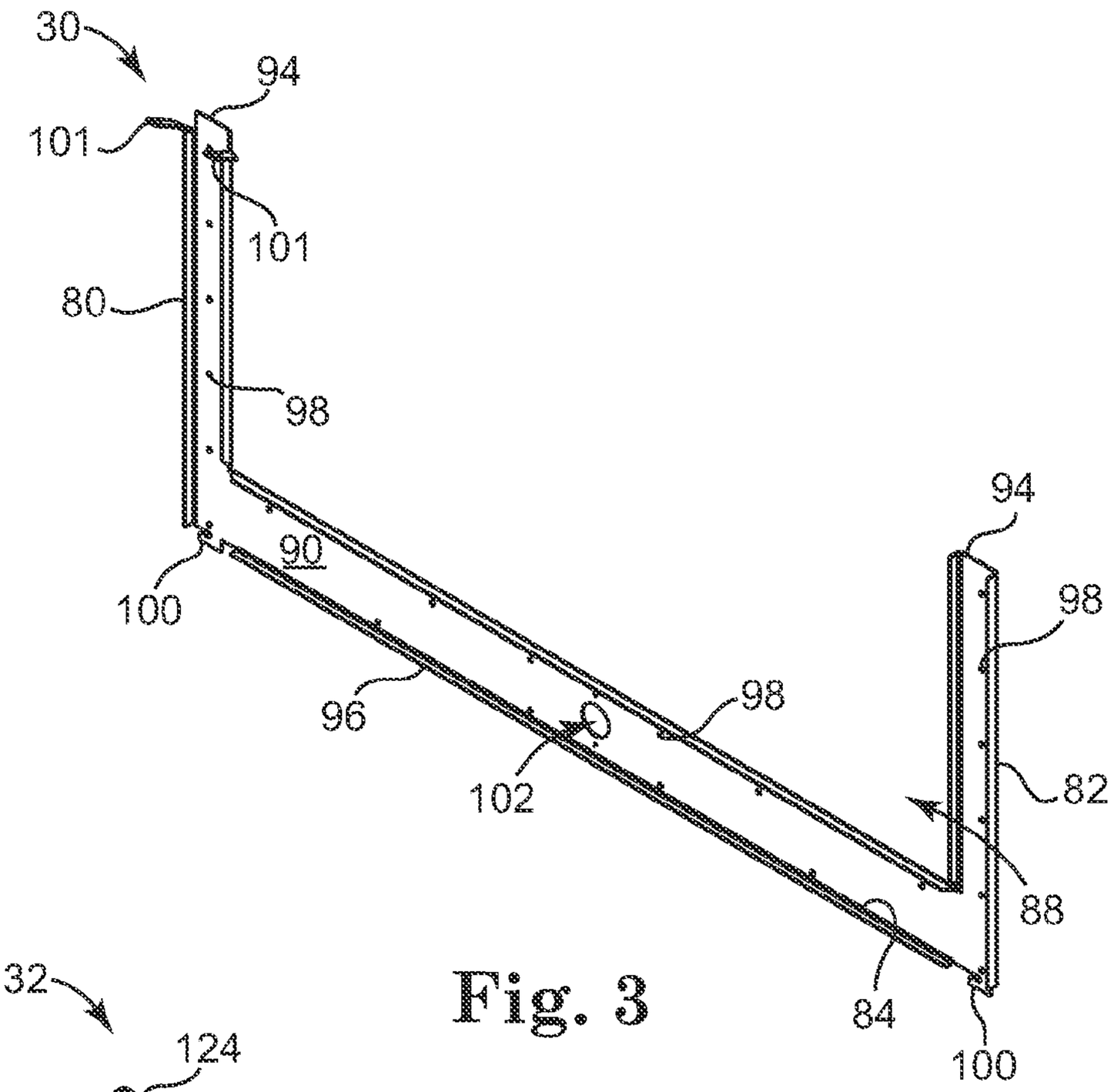
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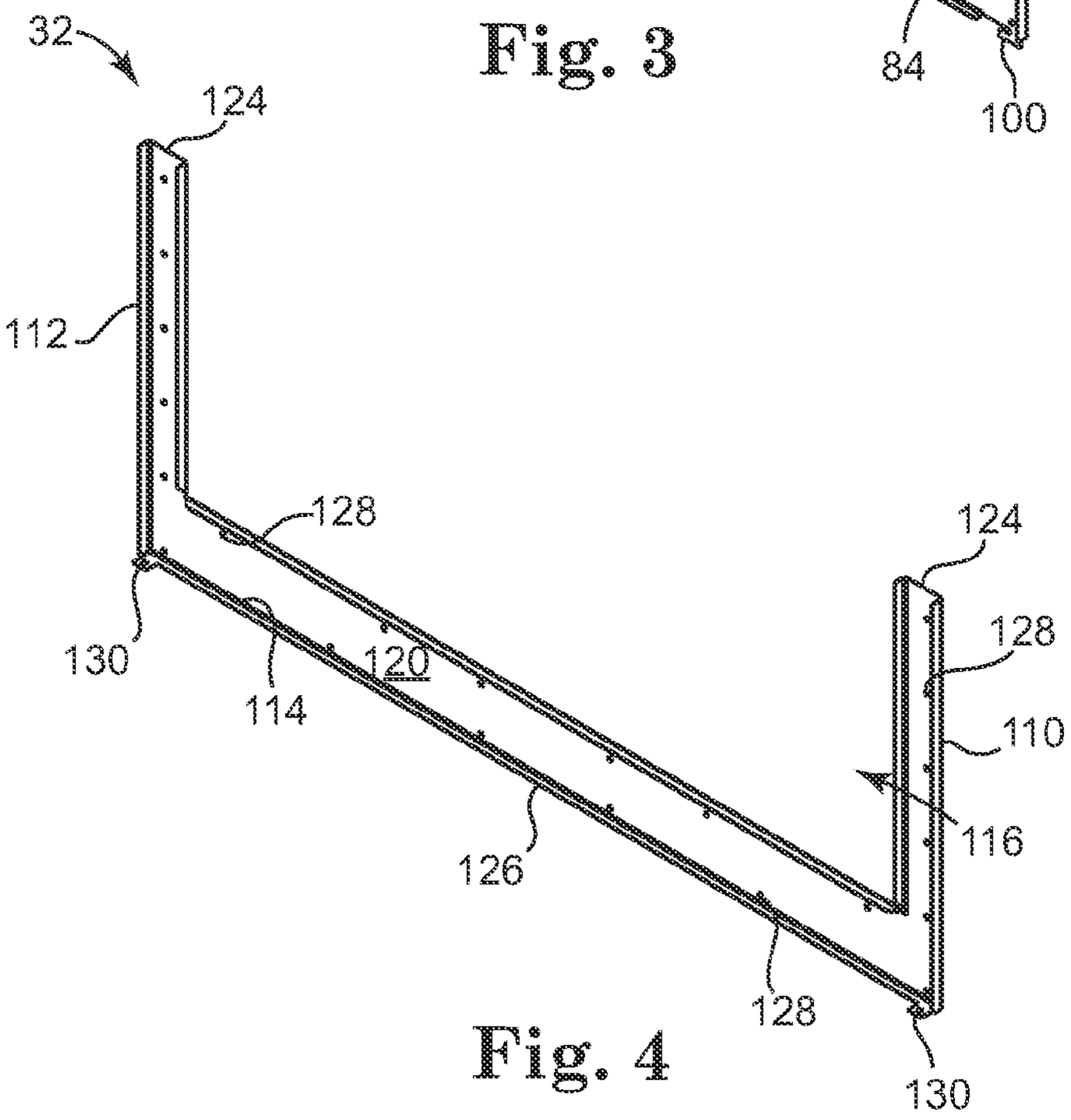
Fig. 3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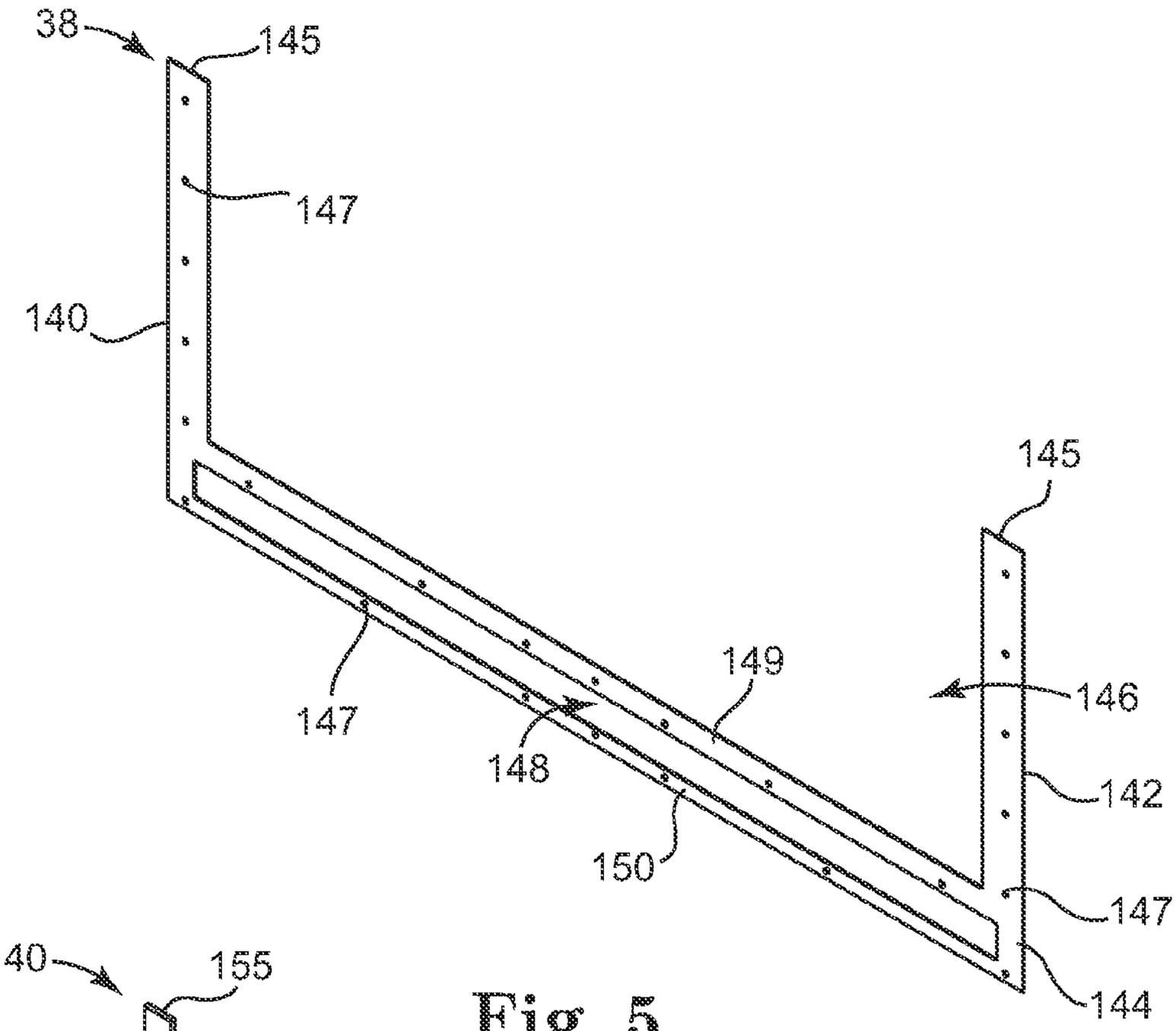
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Fig. 5

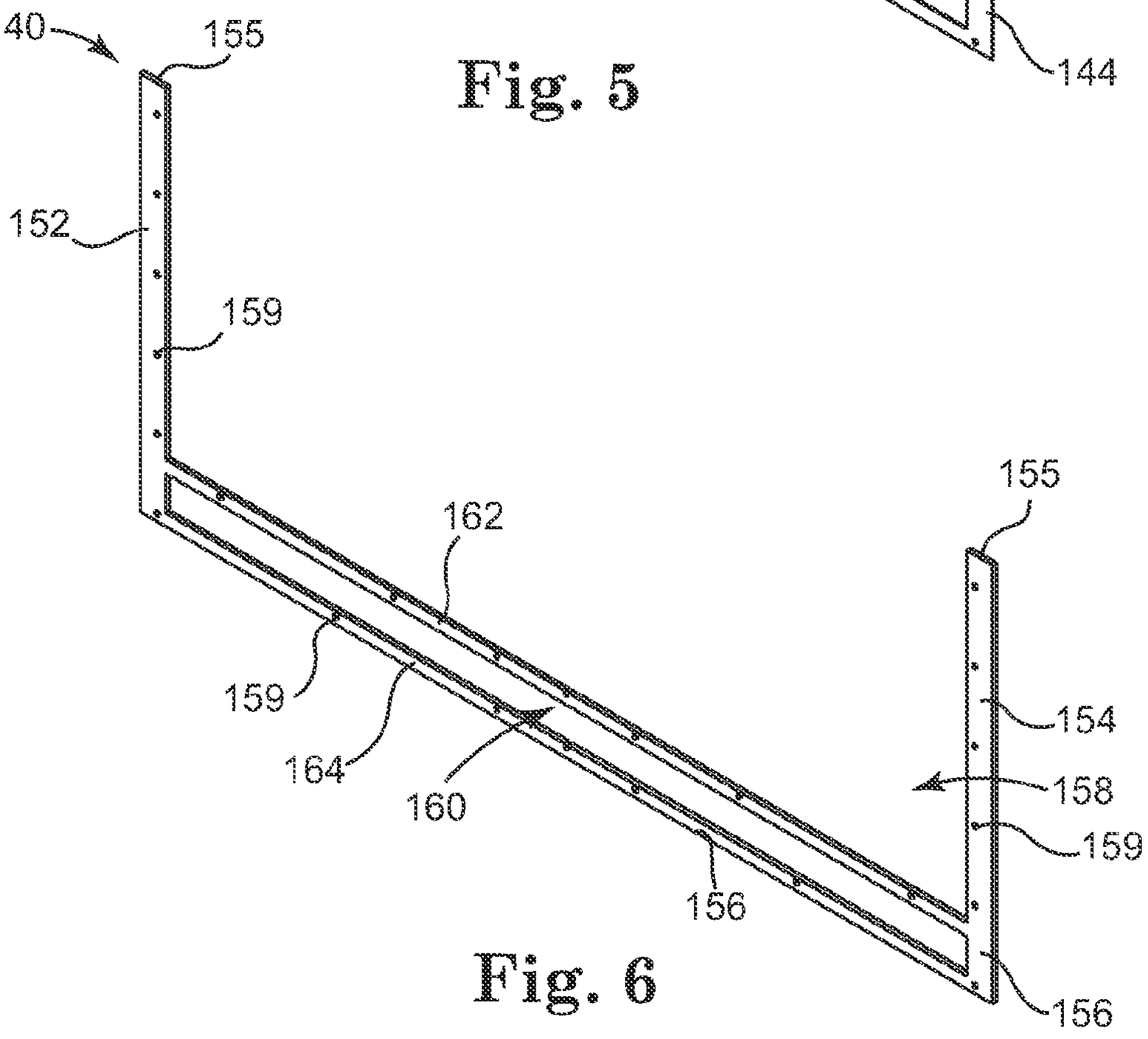
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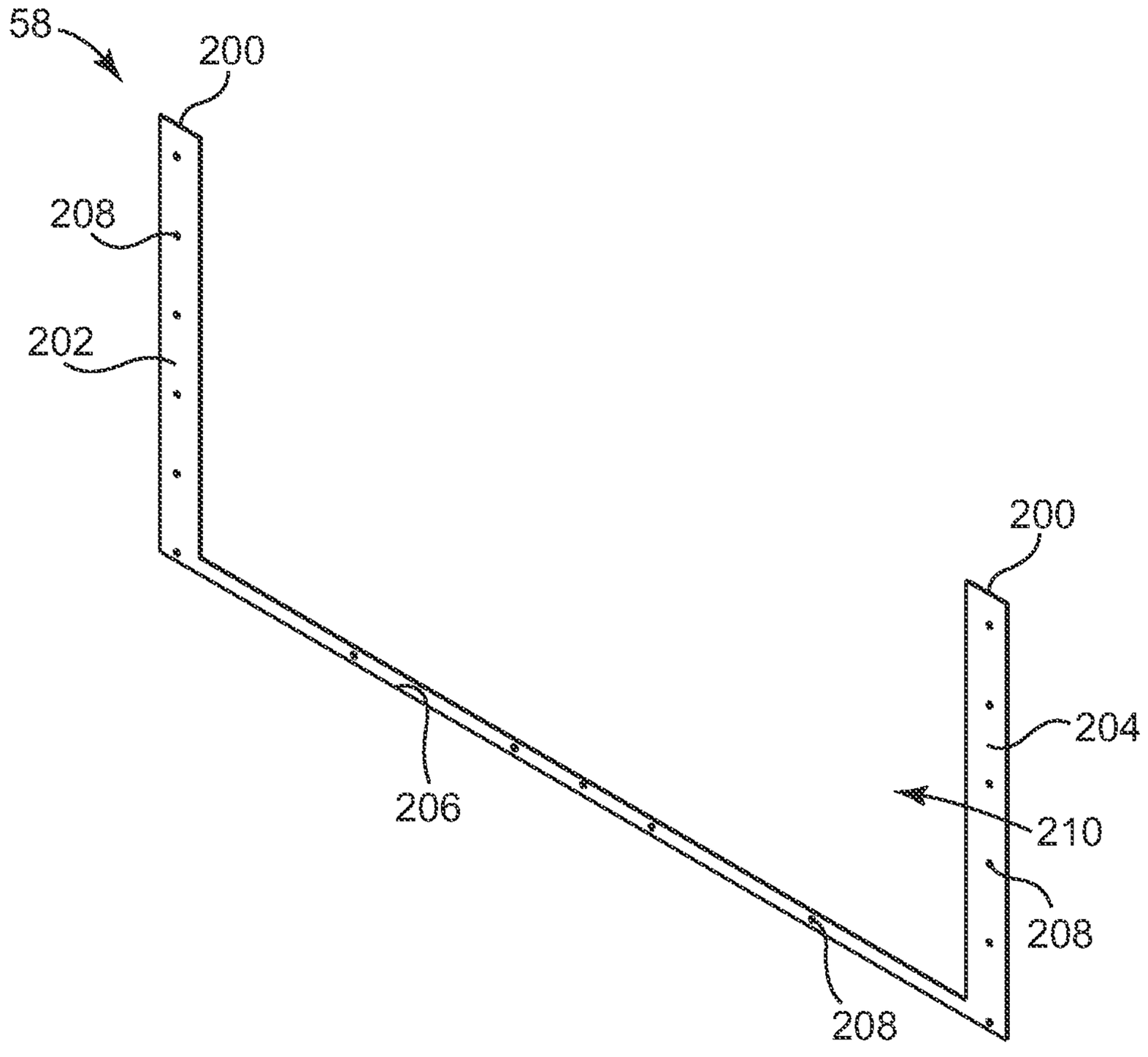
Fig. 6



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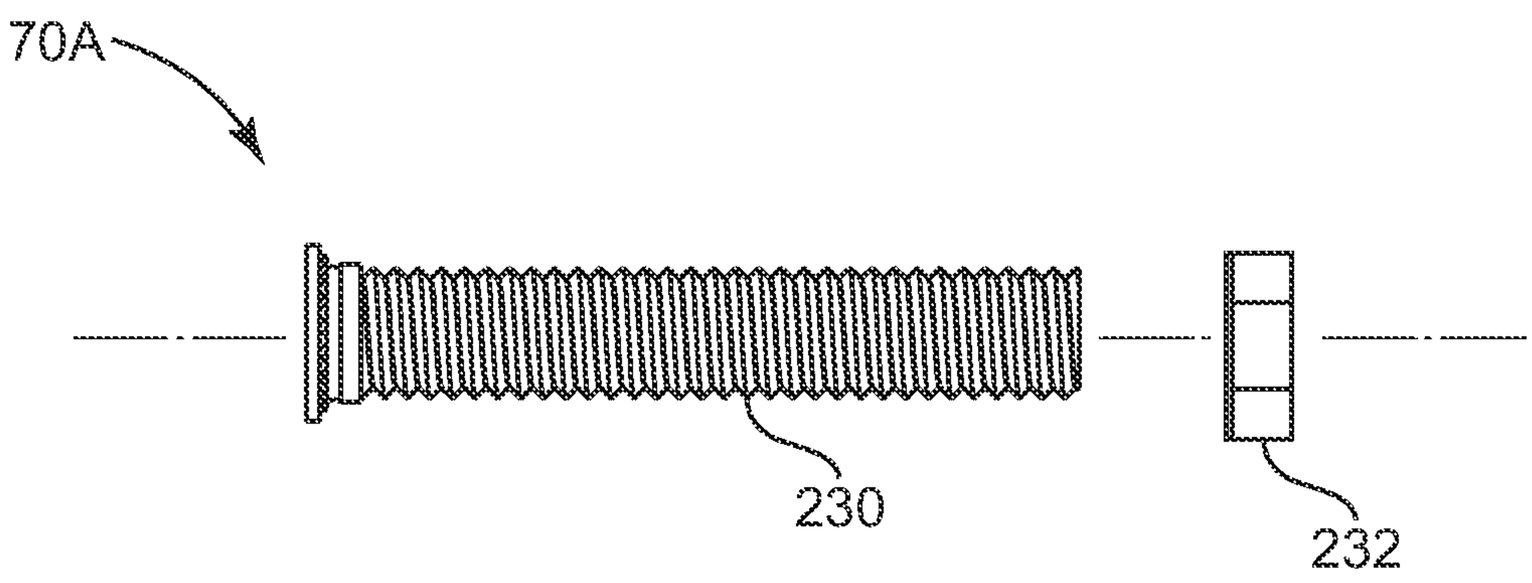

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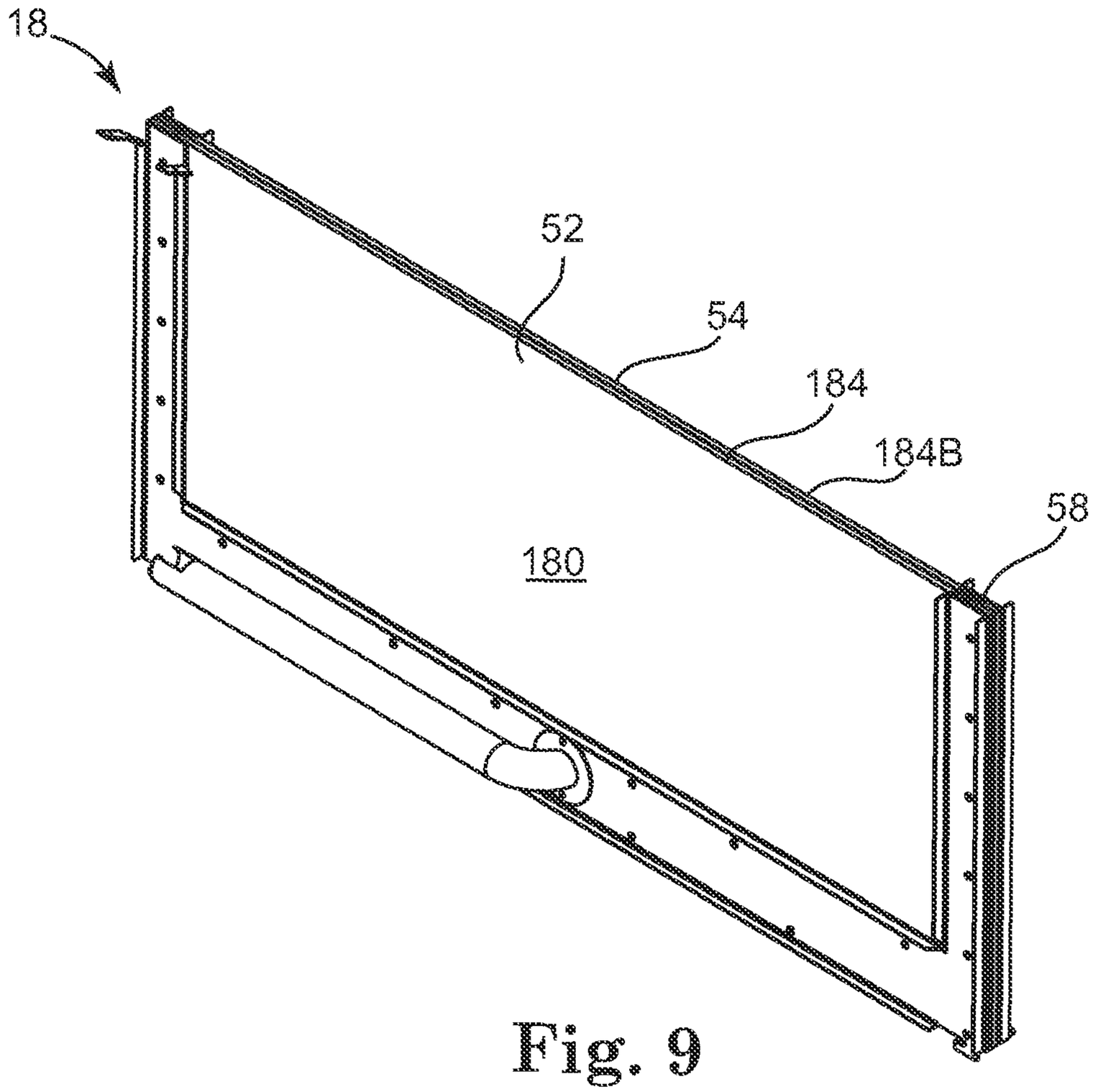

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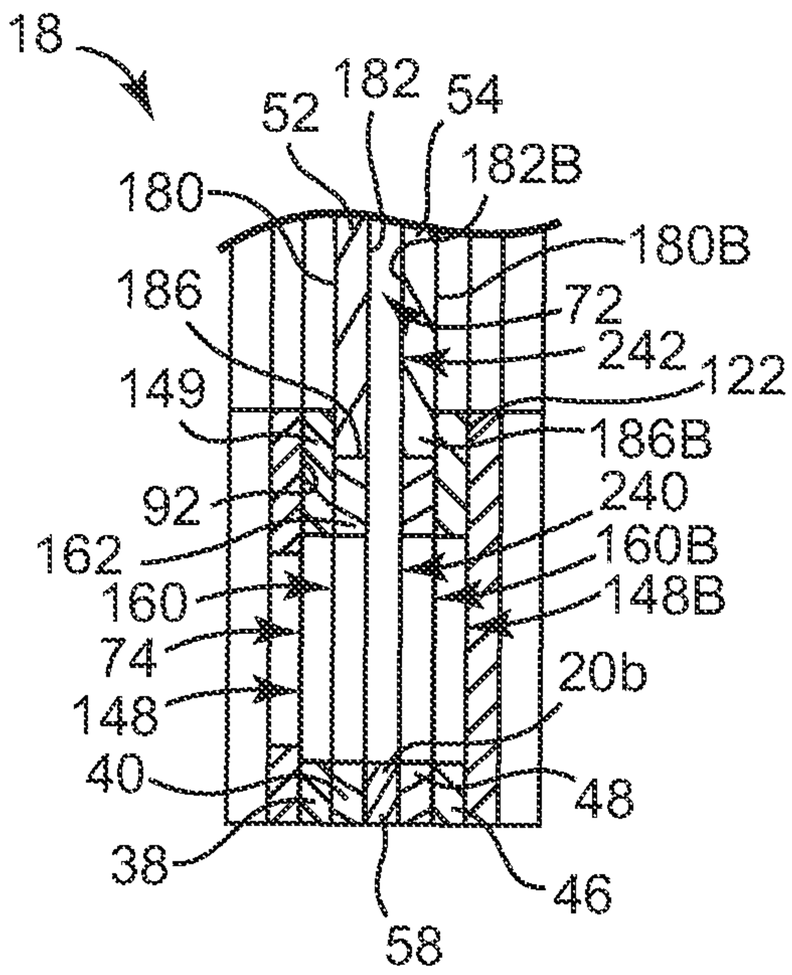

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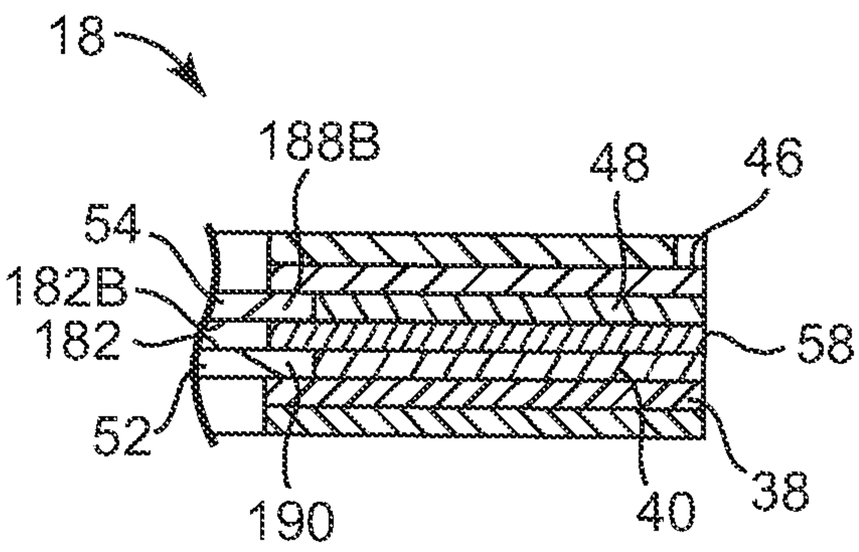

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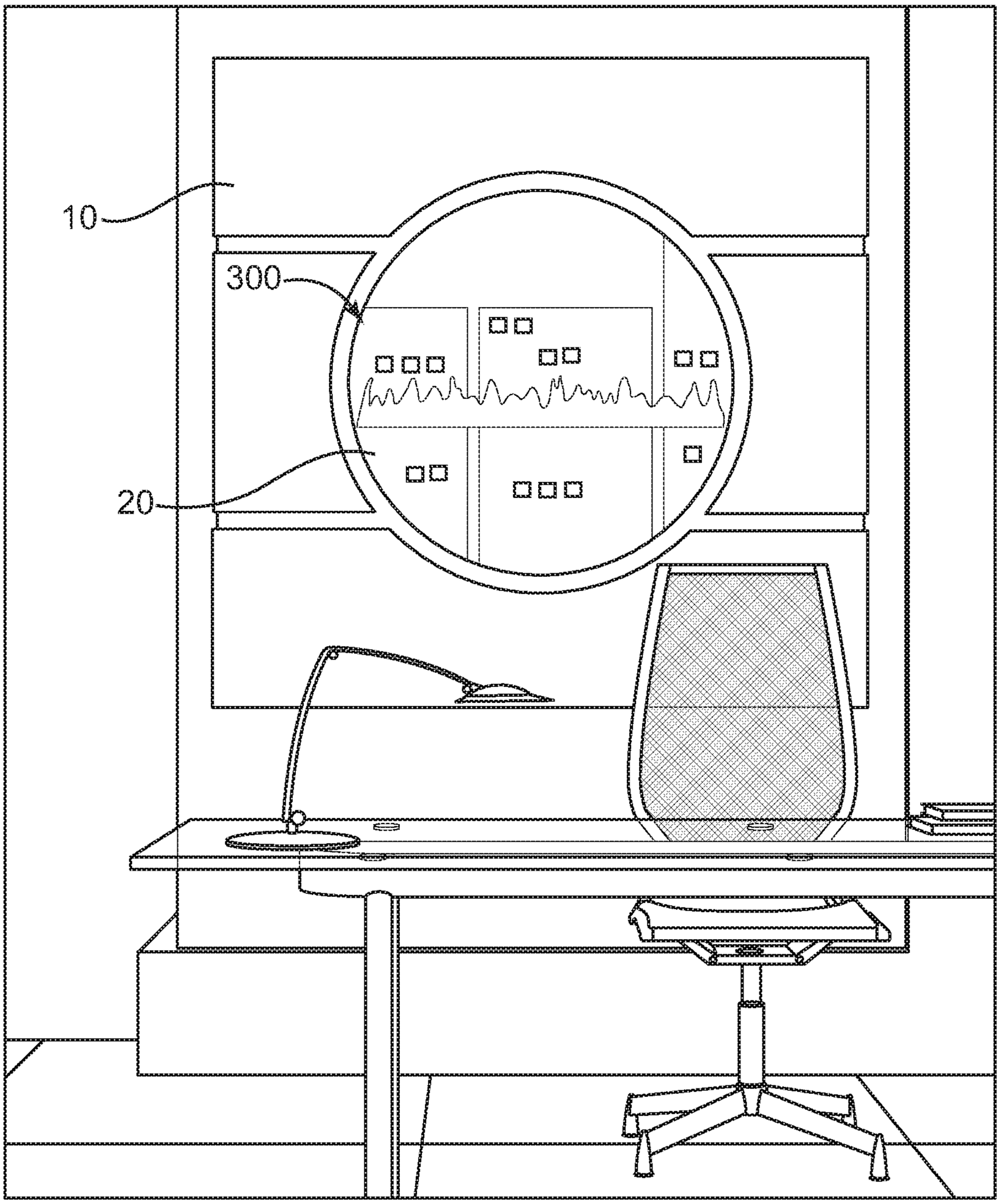

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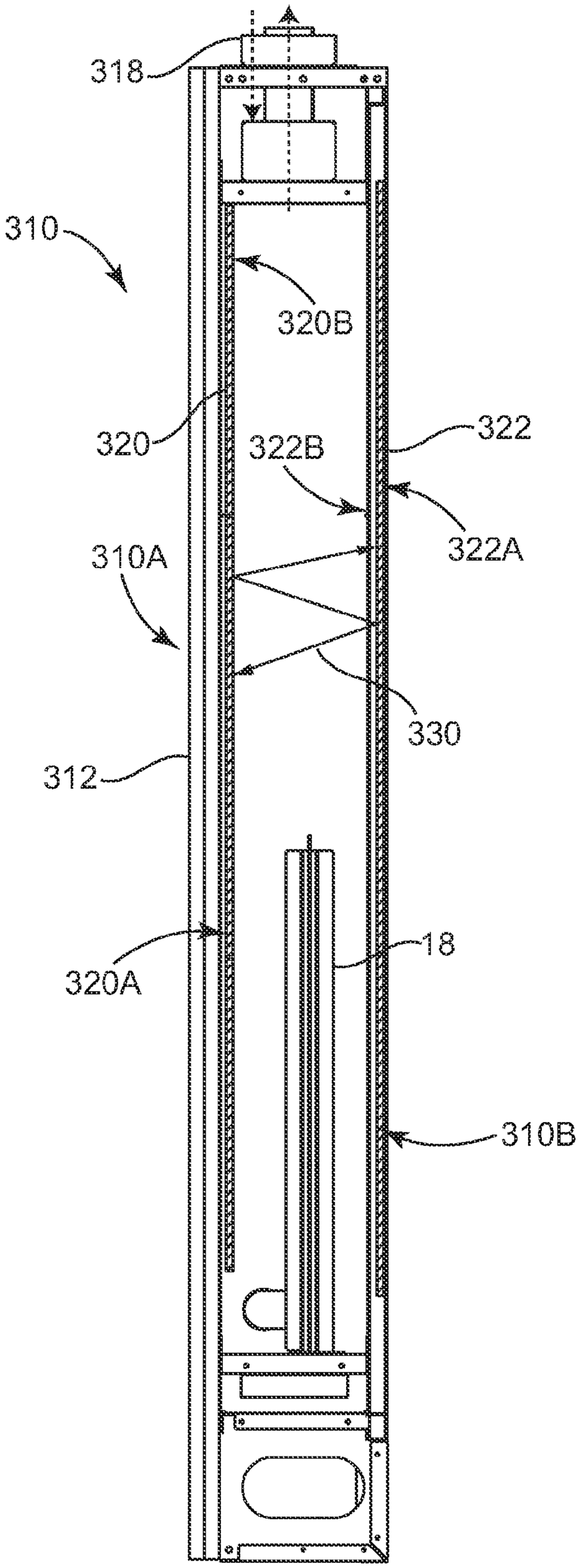
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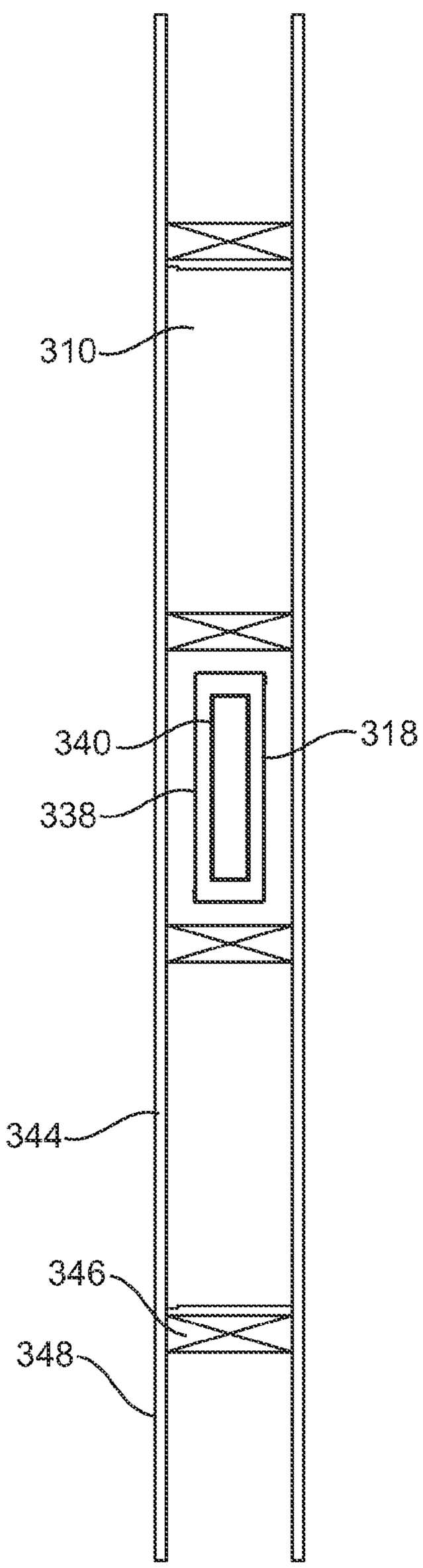
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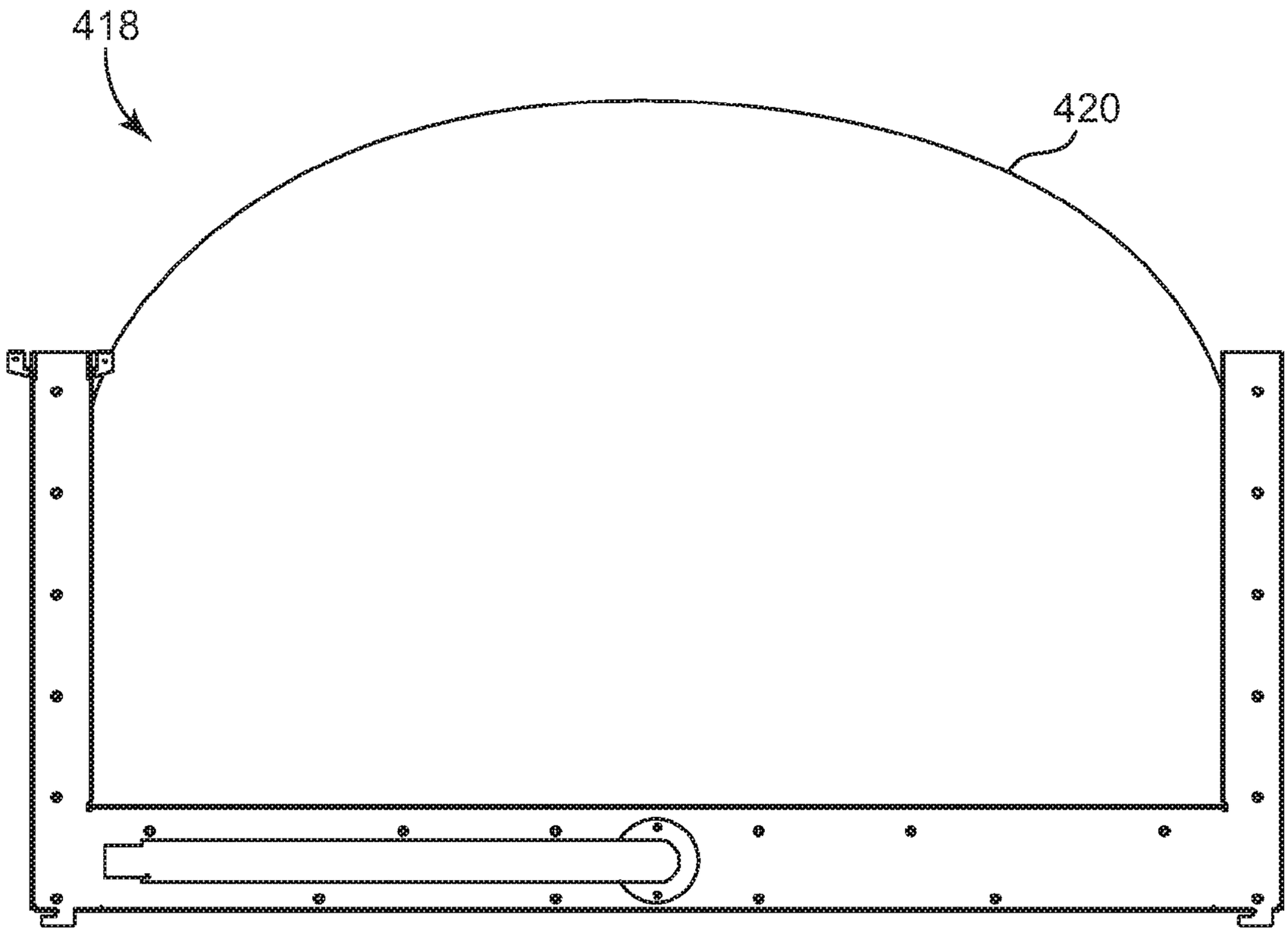
Fig. 14



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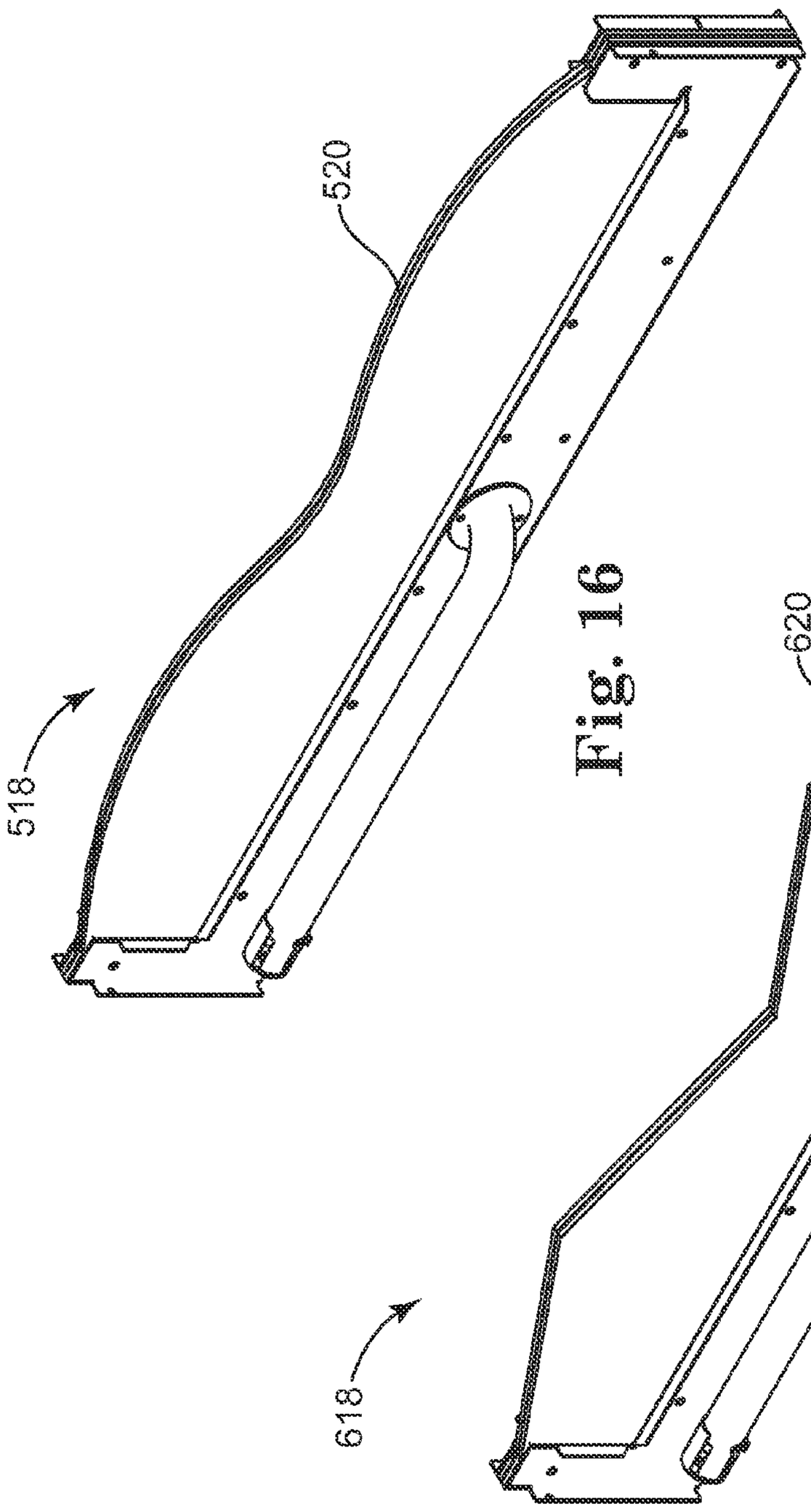

Fig. 16

Fig. 17

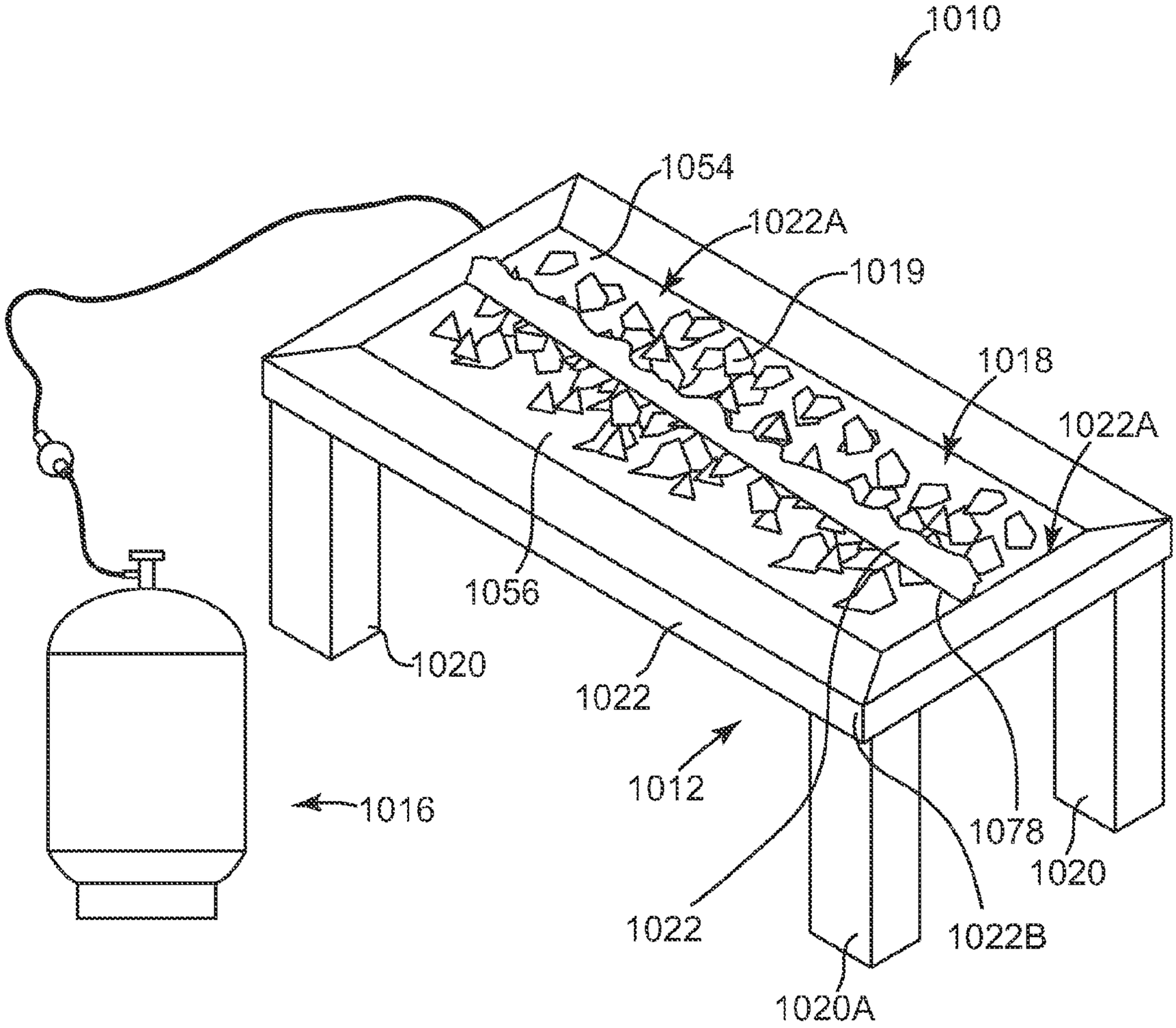
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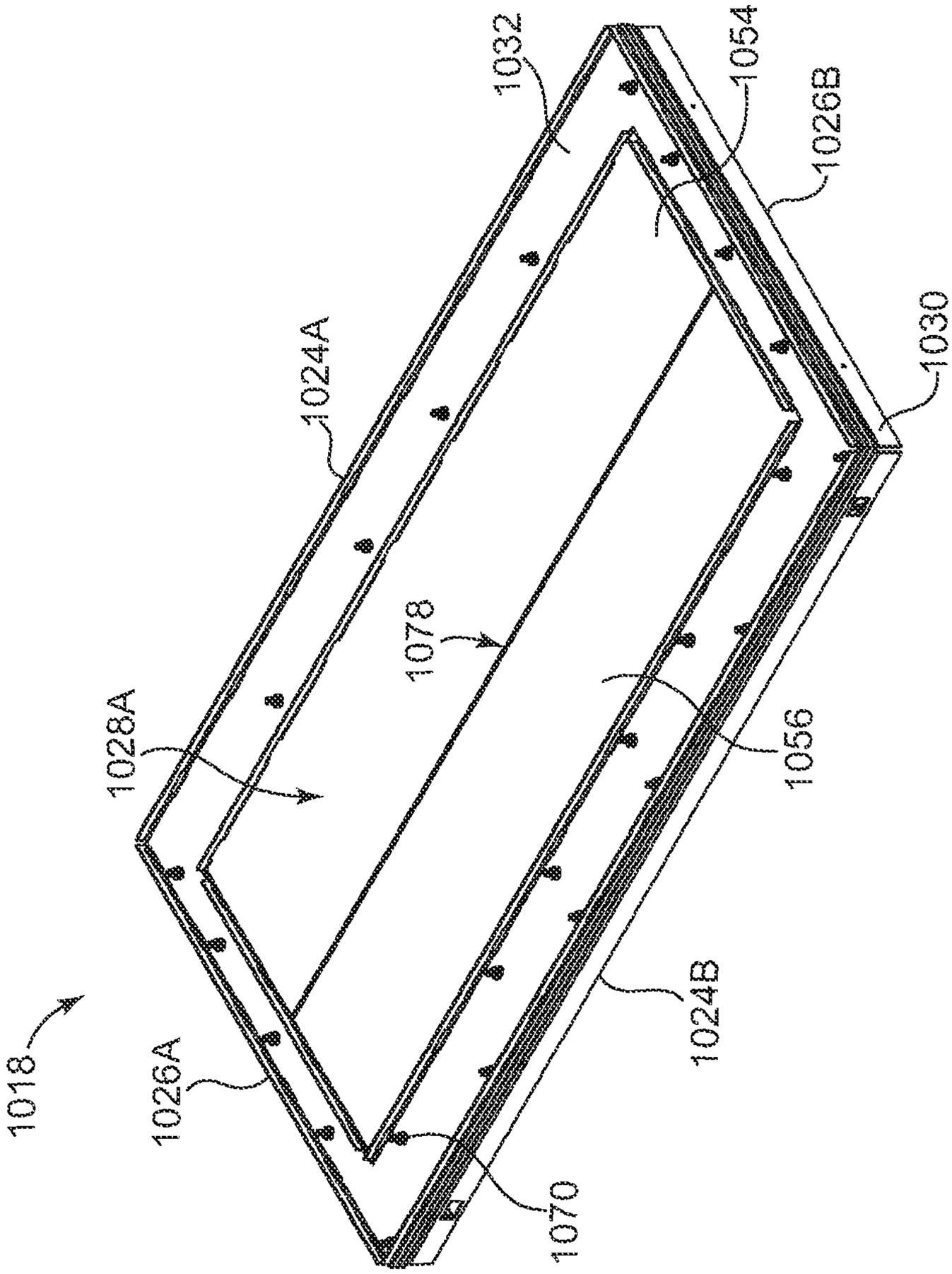
Fig. 18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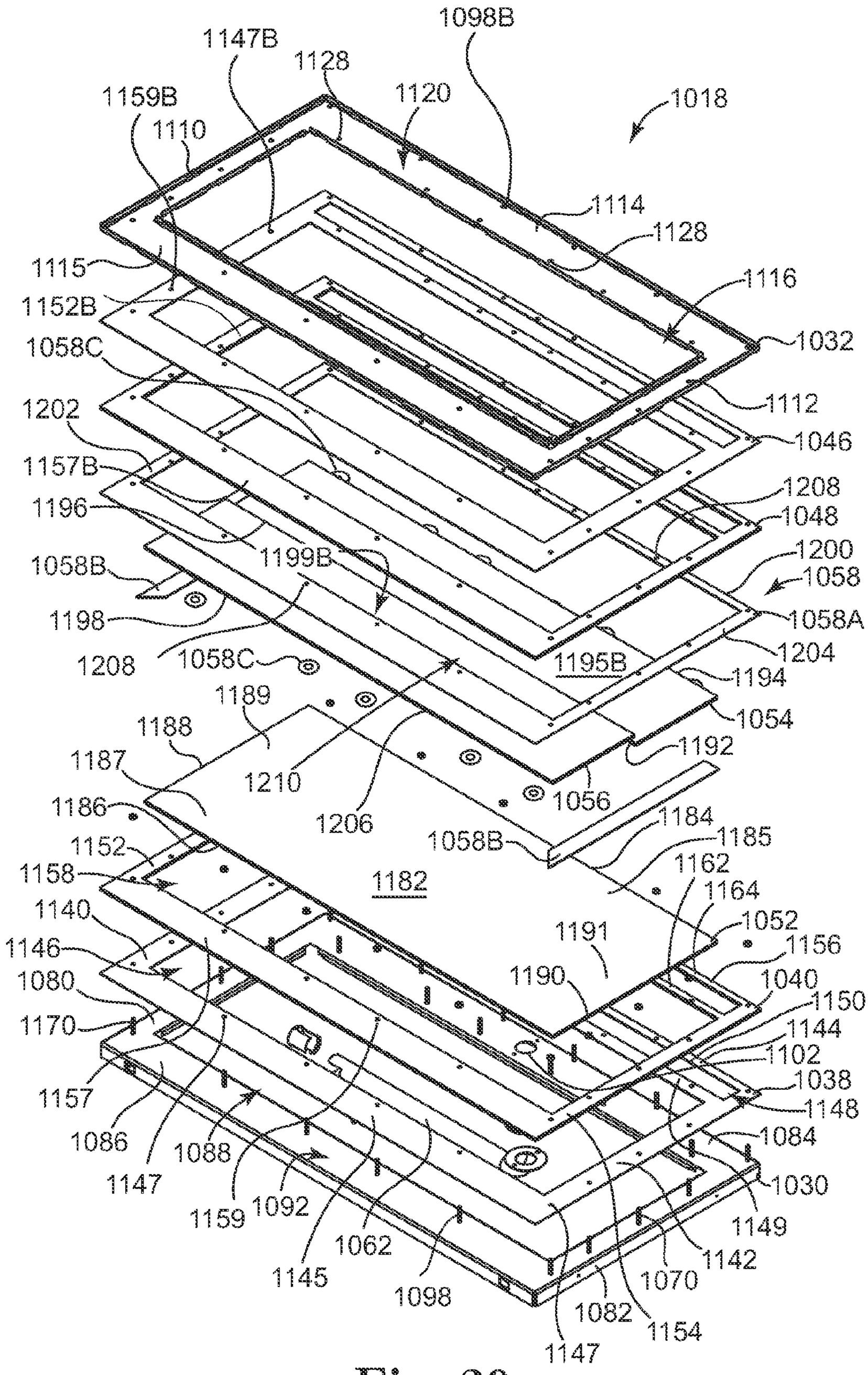
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Fig. 20

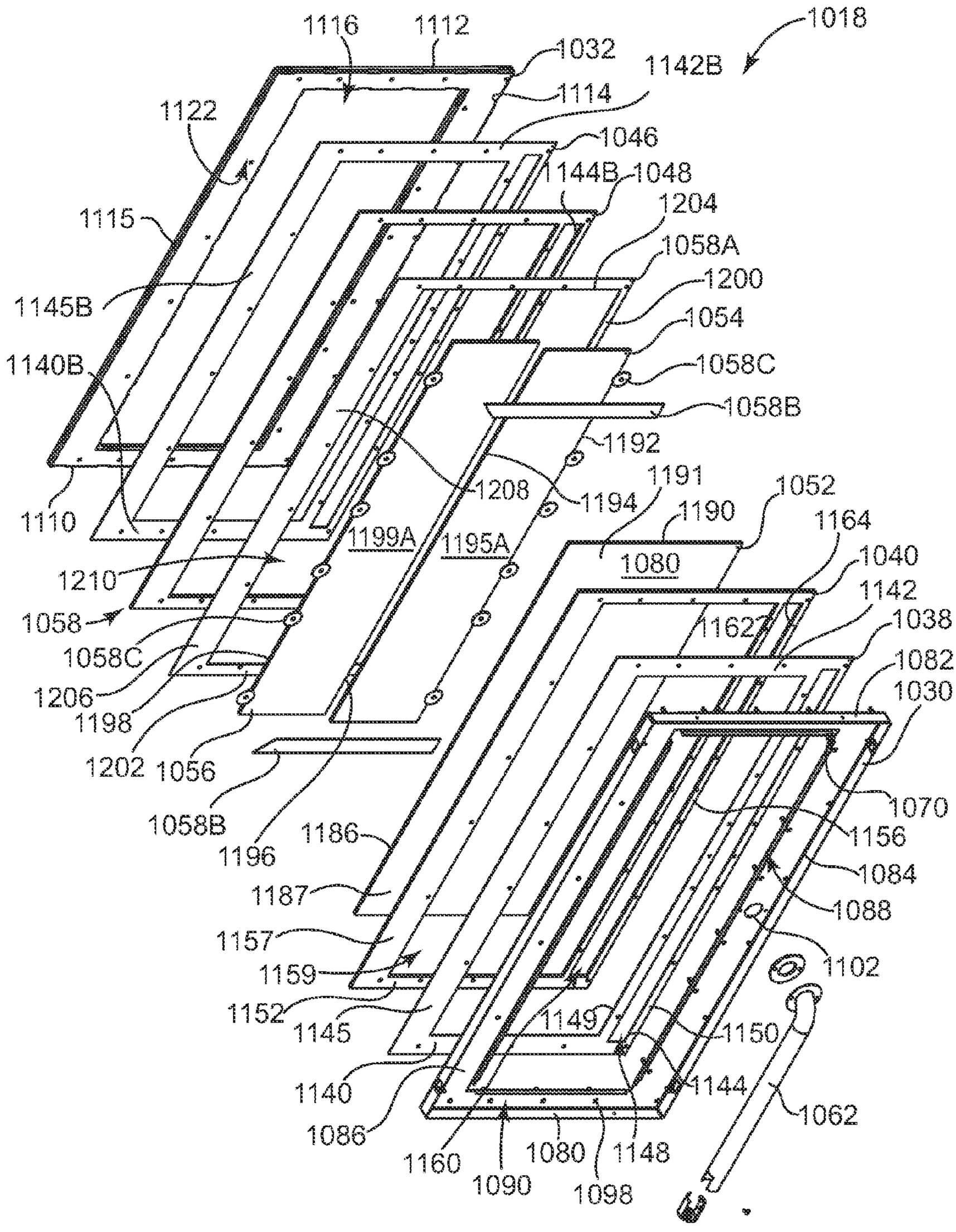
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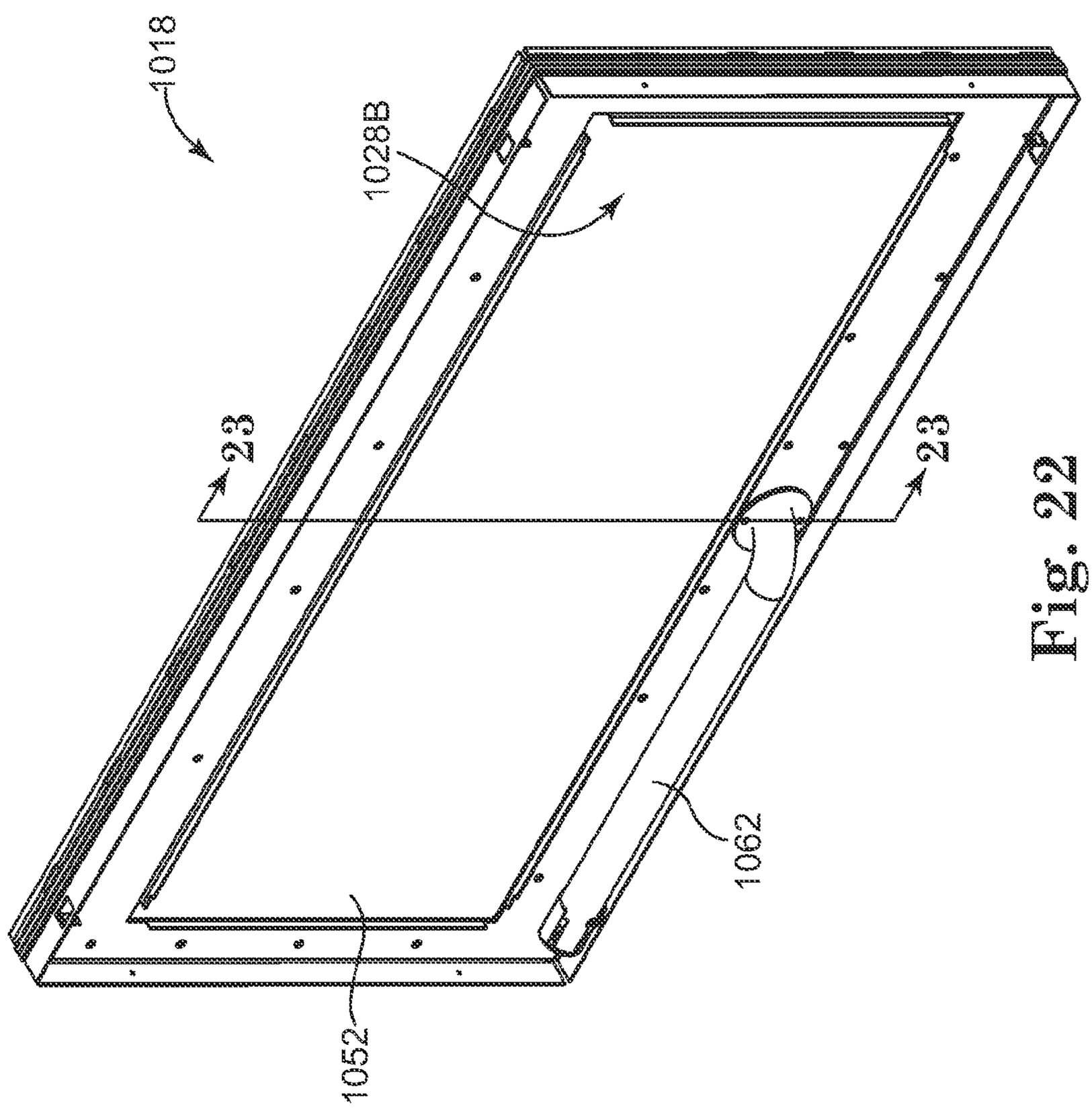
Fig. 21



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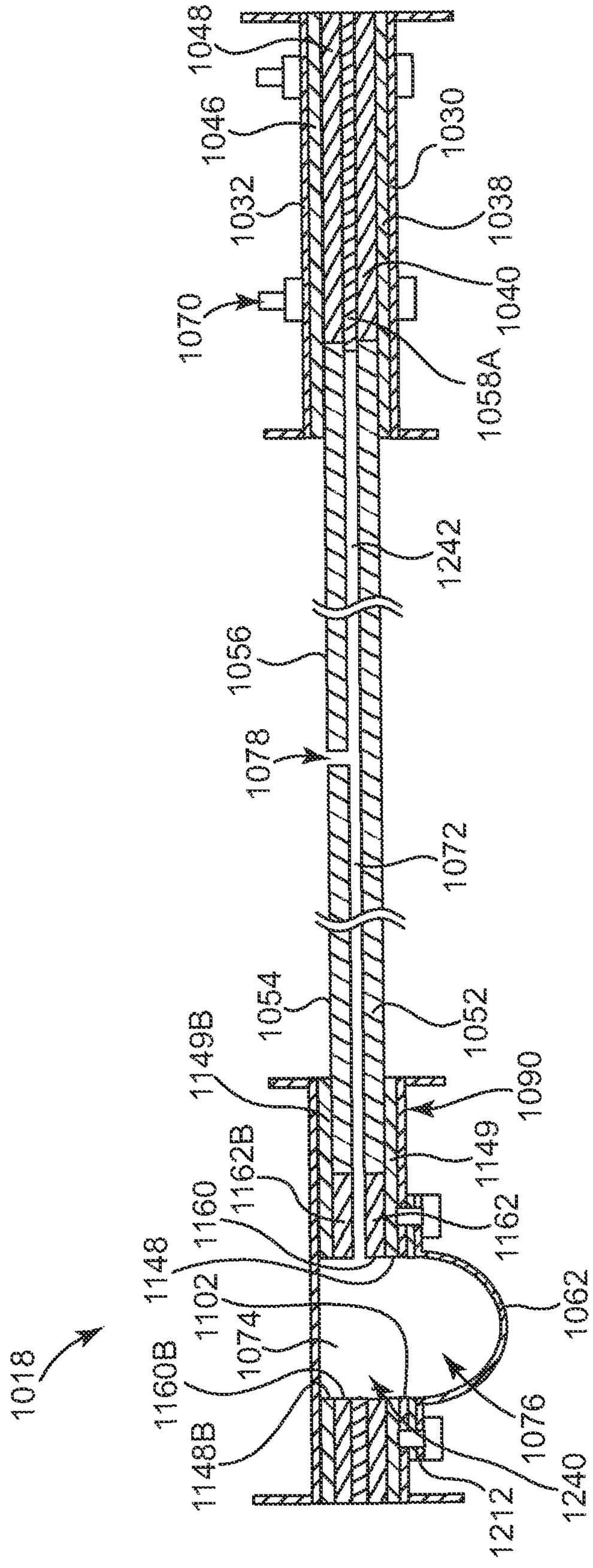
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Fig. 23

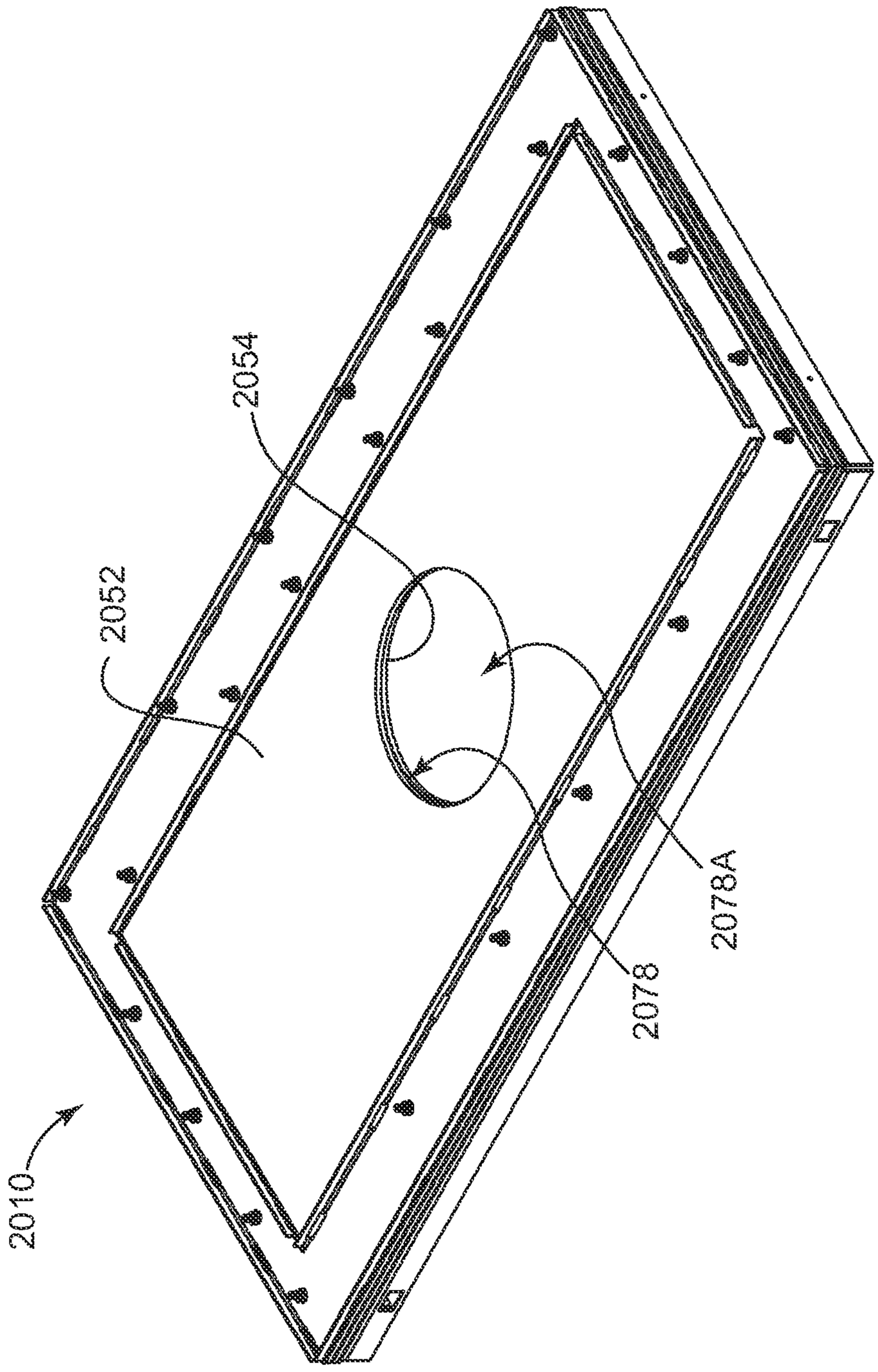

Fig. 24

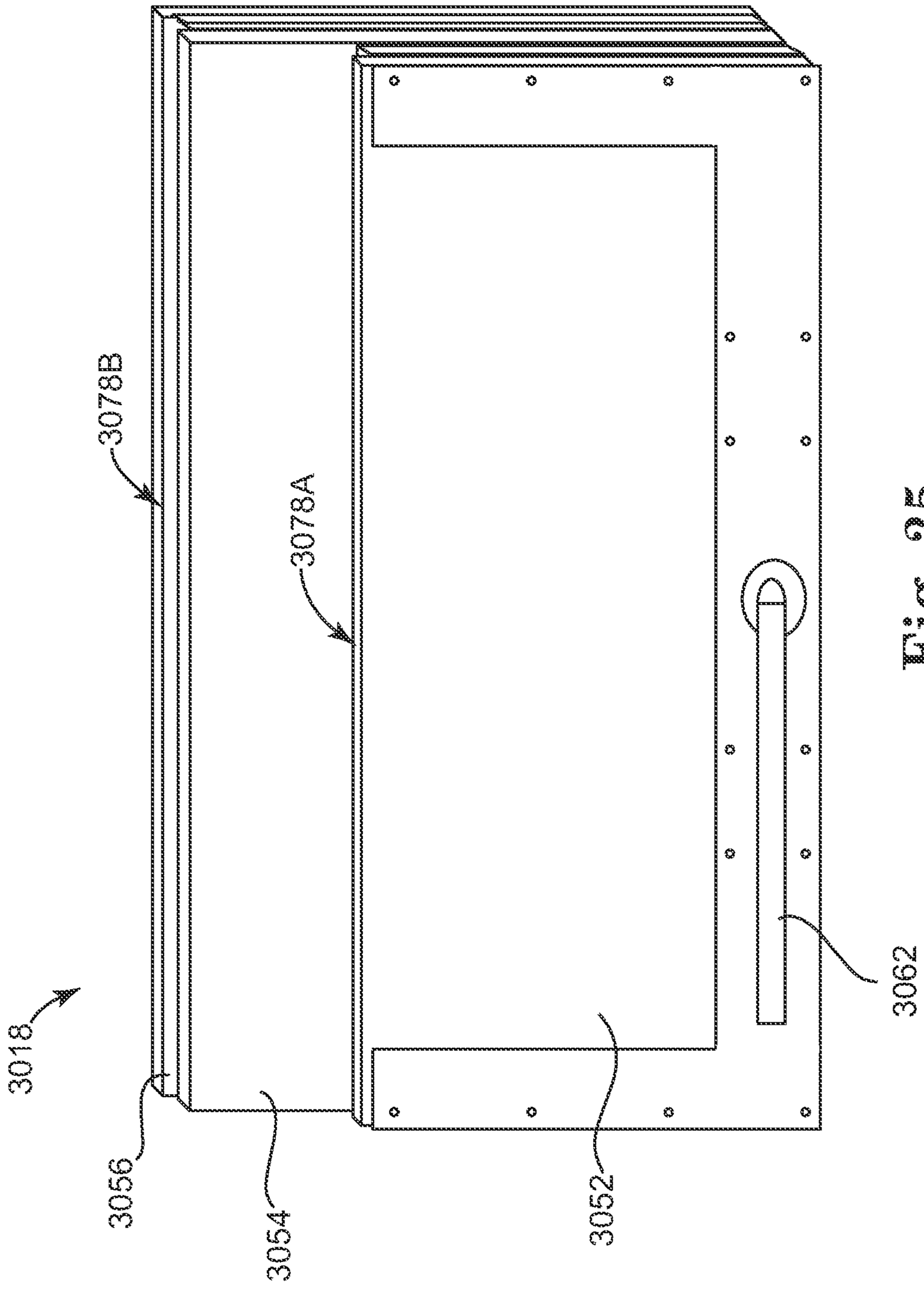

Fig. 25

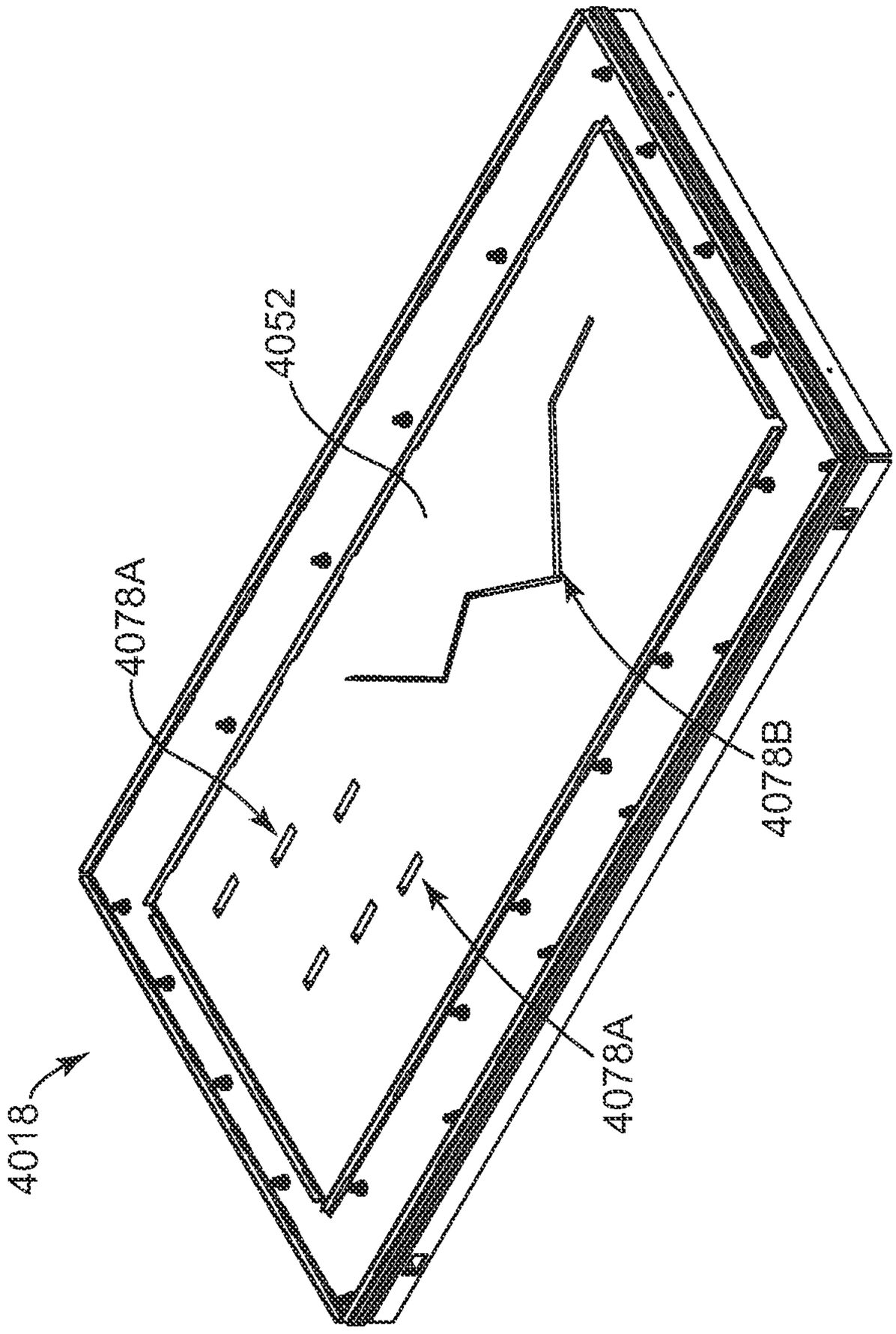

Fig. 26

THIN CHAMBER BURNER

CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation of U.S. patent application Ser. No. 13/257,239, entitled "THIN CHAMBER BURNER", filed Sep. 16, 2011, which is a national phase application of PCT Application No. PCT/US2010/025235, filed pursuant to 35 U.S.C. §371. This application is also a continuation-in-part of U.S. patent application Ser. No. 12/405,842, entitled "THIN CHAMBER BURNER", filed Mar. 17, 2009. Priority is claimed to each of the foregoing applications, each of which is incorporated herein by reference in its entirety for all purposes.

BACKGROUND

Gas burners are used in gas fireplace units and other heating units to produce flames for visual effect and/or heating purposes. Typically, gas burners are used to combust a gas/air mixture thereby producing flames. Often times, gas burners are designed to produce flames that mimic an appearance of a natural, wood burning fire. More common gas burners include tube burners and pan burners. Although the tube- and pan-designs are common, other designs have become more common—including gas burners shaped to mimic an appearance of a wood log, for example.

SUMMARY

Some aspects described herein relate to a gas burner having a high degree of versatility in flame presentation, including, for example, the ability to hide various portions of the burner, produce various flame effects, and provide a slimmer burner design. The versatility of various embodiments described herein allows greater freedom in fireplace design and flame presentation.

For example, some aspects relate to a burner assembly adapted for combustion of gases associated with a heating unit, the burner assembly including two substantially transparent panels supported in a substantially parallel, closely-spaced relationship such that a viewer is able to see through the panels and gaskets and spacers sealing the space between the panels to form a perimeter seal and to define a plenum between the first and second panels with an inlet into the plenum and an outlet out of the plenum.

While multiple embodiments are disclosed, still other embodiments of the present invention will become apparent to those skilled in the art from the following detailed description, which shows and describes illustrative embodiments of the invention. Accordingly, the drawings and detailed description that follows are to be regarded as illustrative in nature and not restrictive.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a front view of a fireplace including a burner assembly, according to some embodiments.

FIG. **2** is a perspective view of the burner assembly of FIG. **1** in an unassembled state, according to some embodiments.

FIG. **3** is a perspective view of a first frame member of the burner assembly of FIG. **2**, according to some embodiments.

FIG. **4** is a perspective view of a second frame member of the burner assembly of FIG. **2**, according to some embodiments.

FIG. **5** is a perspective view of a first intermediate seal of the burner assembly of FIG. **2**, according to some embodiments.

FIG. **6** is a perspective view of a first spacer of the burner assembly of FIG. **2**, according to some embodiments.

FIG. **7** is a perspective view of an inner seal of the burner assembly of FIG. **2**, according to some embodiments.

FIG. **8** is a side view of a fastener of the burner assembly of FIG. **2**, according to some embodiments.

FIG. **9** is a perspective view of the burner assembly of FIG. **2** in an assembled state, according to some embodiments.

FIG. **10** is a cross-sectional view of a portion of the burner assembly along line **10-10** of FIG. **1**, according to some embodiments.

FIG. **11** is a cross-sectional view of a portion of the burner assembly along line **11-11** of FIG. **1**, according to some embodiments.

FIG. **12** is a front view of the fireplace of FIG. **1** installed in a wall, according to some embodiments.

FIG. **13** is a side, cut away view of another fireplace, according to some embodiments.

FIG. **14** is a top view of a fireplace of FIG. **13** installed in a wall, according to some embodiments.

FIG. **15** is a front view of a burner assembly, according to some embodiments.

FIG. **16** is a perspective view of a burner assembly, according to some embodiments.

FIG. **17** is a perspective view of a burner assembly, according to some embodiments.

FIG. **18** is a perspective view of a heating unit, according to some embodiments.

FIG. **19** is a perspective view of a burner assembly of the heating unit of FIG. **18**, according to some embodiments.

FIG. **20** is a first perspective view of the burner assembly of FIG. **19** in an unassembled state, according to some embodiments.

FIG. **21** is a second perspective view of the burner assembly of FIG. **19** in an unassembled state, according to some embodiments.

FIG. **22** is another perspective view of the burner assembly of FIG. **19**, according to some embodiments.

FIG. **23** is a cross-sectional view along line **23-23** of FIG. **22**, according to some embodiments.

FIG. **24** is a perspective view of a burner assembly, according to some embodiments.

FIG. **25** is a perspective view of a burner assembly, according to some embodiments.

FIG. **26** is a perspective view of a burner assembly, according to some embodiments.

While the invention is amenable to various modifications and alternative forms, specific embodiments have been shown by way of example in the drawings and are described in detail below. The intention, however, is not to limit the invention to the particular embodiments described. On the contrary, the invention is intended to include all modifications, equivalents, and alternatives falling within the scope defined by the appended claims.

DETAILED DESCRIPTION

Some of the inventive aspects described herein relate to a gas burner having a high degree of versatility in flame presentation in a heating unit such as a fireplace or table top burner, including, for example, the ability to hide various portions of the burner assembly, produce various flame effects, and/or provide a slimmer burner assembly. The

versatility of various embodiments described herein helps provide greater freedom in fireplace design and flame presentation. Although embodiments having the above-described features are provided herewith, additional or alternative features and associated advantages are also made apparent.

FIG. **1** is a front view of a fireplace **10**, also described as a heating unit, including an outer housing **12**, a combustion chamber **14**, a gas source **16**, and a burner assembly **18**. For ease of illustration, the outer housing **12**, combustion chamber **14**, and gas source **16** are shown in broken lines.

The outer housing **12** is formed of any of a variety of suitable materials, including sheet metals, for example. Likewise, the combustion chamber **14** is formed of any of a variety of suitable materials, including molded ceramic fiber and binder composites, for example. The combustion chamber **14** defines a combustion enclosure **20** adapted to receive heat and combustion products from flames **22** produced by the burner assembly **18**. The combustion chamber **14** includes a transparent front portion **24** (e.g., one or more sheets of transparent glass) for viewing into the combustion enclosure **20**, as well as a transparent rear portion (not shown) as desired. In some embodiments, the combustion chamber **14** includes additional transparent portions (e.g., side, top, etc.) for viewing into the combustion enclosure **20**.

The gas source **16** is optionally a regulator connected to an external gas line (not shown), such as a natural gas or LP gas line associated with residential, commercial, or other structure. Other gases are also contemplated, such as hydrogen, for example. In general terms, the burner assembly **18** of the fireplace **10** is adapted to direct flames into the combustion enclosure **20** of the combustion chamber **14**.

Additional or alternative fireplace components associated materials, and configurations suitable for use in association with the burner assembly **18** are provided in various products offered by Hearth and Home Technologies, Inc. of Minnesota. As examples of patent literature, U.S. Pat. No. 5,016,609, entitled "Direct Vented Multi Glass Side Fireplace," U.S. Pat. No. 5,647,340, entitled "Convertible Dual Direct-Vented Fireplace," U.S. Pat. No. 5,947,112, entitled "Prefabricated Fireplace Exhaust Plenum Structure," U.S. Pat. No. 6,170,481, entitled "Open Ended Molded Fireplace Box and Method," and U.S. Pat. No. 7,077,122, entitled "Reduced Clearance Gas Fireplace," the entire contents of all of which are incorporated herein by reference, provide descriptions of additional or alternative fireplace components associated materials, and configurations suitable for use with the burner assembly **18**, according to some embodiments.

As shown in FIG. **1**, the burner assembly **18** has a first side **26** and a second side **28**. In some embodiments, the burner assembly **18** is about 37 inches long, about 17 inches in height, and about 1.55 inches thick, although a variety of dimensions are contemplated. For reference, the terms "height" and "width" are used interchangeably with reference to the various embodiments described herein. Moreover, although various embodiments are described as being oriented "horizontally," "vertically," or "upright," flame generation using a horizontal orientation for burner assembly embodiments otherwise described as vertical and vice versa are contemplated.

FIG. **2** shows the burner assembly **18** in an unassembled state, according to some embodiments. As shown in FIG. **2**, the burner assembly **18** includes a first frame member **30**, a second frame member **32**, a first intermediate seal **38**, a first spacer **40**, a second intermediate seal **46**, a second spacer **48**, a first plate **52**, a second plate **54**, an inner seal **58**, a connector **62**, an igniter **66**, and a plurality of fasteners **70**. As described in greater detail, below the spacers **40**, **48** and frame members **30**, **32** provide means for supporting the plates **52**, **54** in an opposed relationship while the seals **38**, **46**, **58** provide means for sealing the space between the plates **52**, **54** (e.g., by forming a perimeter seal about the plates **52**, **54**) to form inlet/outlet chambers of the burner assembly **18**.

In some embodiments, various components of the burner assembly **18** are sandwiched together to form a thin, generally vertical structure with the fasteners **70** securing the structure together. Generally, the first and second frame members **30**, **32** (as well as the seals **38**, **46** and spacers **40**, **48**) form a housing around the first and second plates **52**, **54**. As described in greater detail, the burner assembly **18** has an upper manifold **72** (FIG. **10**) that is thin and oriented substantially vertically and a lower manifold **74** (FIG. **11**) in communication with the upper manifold **72**. The upper and lower manifolds **72**, **74** are optionally described as closed plenums or chambers, for example with the lower manifold defining an inlet **76** into the manifolds **72**, **74** and the upper manifold **72** defining an outlet **78** from the manifolds **72**, **74**.

FIG. **3** is a perspective view of the first frame member **30**, according to some embodiments. As shown, the first frame member **30** includes a first upright **80**, or first side portion, a second upright **82**, or second side portion, and a lateral member **84** extending between the first and second uprights **80**, **82**, where the first upright **80**, the second upright **82**, and the lateral member **84** define a central viewing area **88**. The first frame member **30** also defines an outer face **90**, an inner face **92** (FIG. **10**), an upper portion **94** and a lower portion **96**, and has a plurality of fastener holes **98**.

In some embodiments, the first frame member **30** includes a pair of feet **100** at the lower portion **96**, of the first frame member **30** adapted for maintaining the burner assembly **18** (FIG. **1**) in a substantially upright position (e.g., on a bottom portion of the combustion chamber **14**). The inner face **92** of the first frame member **30** is optionally substantially planar overall. In some embodiments, the first upright **80** includes a pair of tabs **101** adapted to maintain the igniter **66**. The lateral member **84** is optionally positioned at the lower portion **96** of the first frame member **30** and has an opening **102**. In some embodiments, the opening **102** is about 1.25 inches in diameter.

Though a variety of materials and forming processes are contemplated, the first upright **80**, the second upright **82**, and the lateral member **84** are optionally formed from a single piece of sheet metal or other material using bending and/or stamping processes, for example. The first upright **80**, the second upright **82**, and the lateral member **84** combine to form a substantially U-shaped frame, where the central viewing area **88** is defined on three sides by the first upright **80**, the second upright **82**, and the lateral member **84** and is open at the upper portion **94**.

FIG. **4** is a perspective view of the second frame member **32**, according to some embodiments. As shown, the second frame member **32** is substantially complementary in configuration to the first frame member **30** and includes a first upright **110**, or first side portion, a second upright **112**, or second side portion, and a lateral member **114** extending between the first and second uprights **110**, **112**, where the first upright **110**, the second upright **112**, and the lateral member **114** define a central viewing area **116**.

The second frame member **32** also defines an outer face **120**, an inner face **122** (FIG. **10**), an upper portion **124**, and a lower portion **126** and has a plurality of fastener holes **128**. The inner face **122** of the second frame member **32** is

optionally substantially planar overall. The second frame member **32** includes a pair of feet **130** at the lower portion **96** of the second frame member **32** adapted for maintaining the burner assembly **18** (FIG. **1**) in a substantially upright position (e.g., on the bottom portion of the combustion chamber **14**). In some embodiments, similar forming processes and materials to those of the first frame member **30** are used to form the second frame member **32**. The first upright **110**, the second upright **112**, and the lateral member **114** combine to form a substantially U-shaped frame, where the central viewing area **116** is defined on three sides by the first upright **110**, the second upright **112**, and the lateral member **114** and is open at the upper portion **124**.

The various seals are shown and described below as pre-formed pieces (e.g., being molded, stamped, or cut out) of material. In some embodiments, however, one or more of the seals are deposited or applied as liquids or gels that cure or are otherwise formed.

FIG. **5** is a perspective view of the first intermediate seal **38**, according to some embodiments. The first intermediate seal **38** is optionally formed as a single piece of gasket material (e.g., high-temp silicone gasket material), or any other suitable material. In some embodiments, the first intermediate seal **38** is about 0.125 inches thick, although a variety of dimensions (e.g., from about 0.1 inches to about 0.8 inches thick) are contemplated. The first intermediate seal **38** includes a first arm **140**, or first side portion, a second arm **142**, or second side portion, and a lower body **144** connecting the first and second arms **140**, **142**. The first intermediate seal **38** also defines an upper portion **145**. The first intermediate seal **38** is substantially U-shaped, for example, defining an open interior **146** bounded by the first arm **140**, the second arm **142**, and the lower body **144** and has a plurality of fastener holes **147** disposed about the first intermediate seal **38**.

The lower body **144** has an opening **148** which, as described in greater detail below, helps provide means for forming a gas plenum. As shown, the opening **148** is substantially rectangular in shape and about 34.5 inches long and from about 1 to about 3 inches in height (e.g., about 2 inches in height), although a variety of shapes and dimensions are contemplated. The lower body **144** has an upper piece **149** above the opening **148** and a lower piece **150** below the opening **148**. The open interior **146** is sized to be substantially smaller than the first plate **52** such that the first arm **140**, the second arm **142**, and the upper piece **149** are sized to overlap the first plate **52** as described in greater detail below.

The second intermediate seal **46** is substantially similar to the first intermediate seal **38**, according to some embodiments. As such, where features of the second intermediate seal **46** are described and referenced in the drawings they are designated by a similar reference number to the first intermediate seal **38** followed by a "B."

FIG. **6** is a perspective view of the first spacer **40**. The first spacer **40** is optionally formed as a single piece of material. In some embodiments, the first spacer **40** is adapted to support the first plate **52** and/or to provide anchor points for fastening the various burner components together without unduly stressing the first plate **52**. For example, the first spacer **40** is formed of steel or another sufficiently rigid material (e.g., polymeric or metallic materials) for supporting the first plate **52** and/or providing suitable assembly anchor points. In some embodiments, the first spacer **40** is about 0.25 inches thick, although a variety of dimensions are contemplated (e.g., from about 0.1 to about 0.5 inches thick). In some embodiments, the first spacer **40** has about the same thickness as the first plate **52**.

The first spacer **40** includes a first arm **152**, or first side portion, a second arm **154**, or second side portion, and a lower body **156** connecting the first and second arms **152**, **154**. The first spacer **40** also has an upper portion **155**. In some embodiments, the first spacer **40** is substantially U-shaped, defining an open interior **158** bounded by the first arm **152**, the second arm **154**, and the lower body **156**. The open interior **158** is sized to be substantially complementary in size to the first plate **52**, such that the first plate **52** is able to be received in the open interior **158** in a substantially complementary fit. The first spacer **40** also includes a plurality of fastener holes **159** disposed about the first spacer **40**.

The lower body **156** has an opening **160** which, as subsequently described, helps provide means for forming a lower manifold, or plenum of the burner assembly **18**. As shown, the opening **160** is substantially rectangular in shape and about 34.5 inches long and about 2 inches high, although a variety of shapes and dimensions are contemplated (e.g., from about 1 inch to about 3 inches in height). The lower body **156** defines an upper piece **162** above the opening **160** and a lower piece **164** below the opening **160**.

The second spacer **48** is substantially similar to the first spacer **40**, according to some embodiments. As such, where features of the second spacer **48** are described and referenced in the drawings they are designated by a similar reference number to the first spacer **40** followed by a "B."

As shown in FIG. **2**, in some embodiments, the first plate **52** is substantially rectangular in shape, having a length of about 35 inches, a height of about 14 inches, and a thickness of about 0.25 inches, although a variety of dimensions are contemplated (e.g., a plate thickness from 0.1 to about 0.5 inches). The first plate **52** is optionally formed of ceramic glass, or other suitable material.

In some embodiments, the first plate **52** is formed of a substantially transparent, or see-through material such that light is able to pass through the first plate **52**. In other embodiments, the first plate **52** is formed of substantially reflective material (e.g., a material such as Mirropane™ available from Toledo-Pilkington North America Inc. of Toledo, Ohio) or other materials. In still other embodiments, the first plate **52** is formed of opaque materials, such as marble, porcelain, stone, metal, or others. The first plate **52** defines an outer face **180**, an inner face **182** (FIG. **10**), a top edge **184** along an upper portion **185** of the first plate **52**, also described as a terminal edge, a bottom edge **186** along a lower portion **187** of the first plate **52**, also described as a perimeter edge, a first side edge **188** along a first side portion **189** of the first plate **52**, and a second side edge **190** along a second side portion **191** of the first plate **52**.

In some embodiments, the inner and/or outer faces **180**, **182** of the first plate **52** are substantially planar, where the inner and/or outer faces **180**, **182** are optionally smooth (e.g., as with typical sheet glass) or include surface features (e.g., bumps, ridges, dimpling, facets, or other features) while being considered substantially planar. In some other embodiments, the inner and/or outer faces **180**, **182** are not substantially planar (e.g., including larger-scale waves or bends). For example, the first and second plates **52**, **54** are optionally substantially S-shaped and fit together, at a spaced relationship, in a complementary manner.

The second plate **54** is optionally substantially similar to the first plate **52**, according to some embodiments. As such, where features of the second plate **54** are described and referenced in the drawings they are designated by a similar

reference number to the first plate **52** followed by a "B." Each of the first and second plates is optionally described as panels, planer members, or sheets as desired.

FIG. **7** is a perspective view of the inner seal **58**, according to some embodiments. The inner seal **58** is optionally formed as a single piece of gasket material, or any suitable material (e.g., high temp silicone gasket material). In some embodiments, the inner seal **58** is about 0.06 inches thick, although a variety of dimensions are contemplated (e.g., from about 0.01 inches to about 0.25 inches thick). The inner seal **58** has an upper portion **200** and includes a first arm **202**, or first side portion, a second arm **204**, or second side portion, and a lower body **206** connecting the first and second arms **202**, **204**. The inner seal **58** also includes a plurality of fastener holes **208** disposed about the inner seal **58**.

The inner seal **58** is substantially U-shaped, defining an open interior **210** bounded by the first arm **202**, the second arm **204**, and the lower body **206**. The open interior **210** is sized to be shorter than the first and second plates **52**, **54** such that the first and second arms **202**, **204** are sized to abut the first and second plates **52**, **54** upon assembly of the burner assembly **18**. In turn, the open interior **210** is substantially taller (or in alternate terms, wider) than the first plate **52** to leave space under the first and second plates **52**, **54**. In particular, the first and second arms **202**, **204** are adapted to overlap the first plate **52** while the lower body **206** resides below the first and second plates **52**, **54** at an offset from the bottom edges **186**, **186**B of the first and second plates **52**, **54**. In some embodiments, the lower body **206** is about 0.6 inches in height, for example.

As shown in FIG. **2**, in some embodiments the connector **62**, also described as a conduit, includes a tubular, hollow body **211**, or tubular member, and a flange **212** secured at one end of the body **211**. The body **211** includes an elbow bend **214** proximate the flange **212** and is slotted at an opposite end, for example, to facilitate use of an air-to-gas mixture control means.

As shown in FIG. **2**, in some embodiments the igniter **66** includes a spark generation probe or probes **220** and is generally adapted to ignite combustible gases and gas/air mixtures. The igniter **66** is adapted to be mounted to the pair of tabs **101** of the first frame member **30**. The igniter **66** is connected to a suitable power source and controller (not shown) for timing and other ignition system control.

FIG. **8** shows a first fastener **70**A of the plurality of fasteners **70**. As shown, the first fastener **70**A includes a body portion **230** and a complementary head portion **232**. The first fastener **70**A is optionally adapted to be self locking and secured in a bolt-and-nut fashion, though a variety of fasteners, including adhesives, for example, are also contemplated. Each of the plurality of fasteners **70** is optionally substantially similar to the first fastener **70**A, according to some embodiments.

FIG. **9** is a perspective view of the burner assembly **18** of FIG. **2** in an assembled state. FIG. **10** is a cross-sectional view of a portion of the burner assembly **18** without the connector **62** along line **10-10** shown in FIG. **1** and FIG. **11** is another cross-sectional view of a portion of the burner assembly **18** along line **11-11** shown in FIG. **1**. Reference can be made between the unassembled, or exploded view of FIG. **2** and the assembled views of FIGS. **9-11** as appropriate to assist in understanding some methods of assembling the burner assembly **18**.

In some embodiments, assembly includes disposing the first and second plates **52**, **54** in a substantially parallel, spaced relationship with the inner seal **58** disposed between the first and second plates **52**, **54**. The inner seal **58** is optionally substantially compliant and helps reduce the effects of irregularities, misalignment, and/or stress concentrations on the plates **52**, **54**. Where the plates **52**, **54** are formed of glass or other ceramic material, such compliance is useful to prevent cracking of the plates **52**, **54**, although the first and second spacers **40**, **48** also optionally assist in this regard.

In some embodiments, the inner seal **58** is abutted against the inner face **182** of the first plate **52** and inner face **182**B of the second plate **54**, respectively such that the inner seal **58** runs along the first and second side edges **188**, **190** of the first plate **52** and first and second side edges **188**B, **190**B of the second plate **54**. The upper portion **200** of the inner seal **58**, the top edge **184** of the first plate **52**, and top edge **184**B of the second plate **54** are substantially aligned with one another and the lower body **206** of the inner seal **58** is positioned below the bottom edge **186** of the first plate and bottom edge **186**B of the second plate **54** to define an opening **240** forming part of the lower manifold **74** and being in communication with the upper manifold **72** as shown in FIG. **10**.

In some embodiments, the first spacer **40** receives the first plate **52** in the open interior **158** (FIG. **2**) of the first spacer **40**. In turn, the second spacer **48** similarly receives the second plate **54** in the open interior **158**B (FIG. **2**) of the second spacer **48**. In some embodiments, the first and second plates **52**, **54** generally rest on the first and second spacers **40**, **48**, respectively. The plates **52**, **54** and spacers **40**, **48**, respectively, form a generally complementary fit as desired, although some play or tolerance is optionally provided in such a fit to account for thermal expansion, assembly misalignment, or other considerations.

In some embodiments, the first intermediate seal **38** is abutted against the outer face **180** of the first plate **52**, as well as the first spacer **40**, and the second intermediate seal **46** is abutted against the outer face **180**B of the second plate **54**, as well as the second spacer **48**. In particular, the intermediate seals **38**, **46** are abutted against the first and second plates **52**, **54**, respectively, toward the outer perimeters of each of the first and second plates **52**, **54**. The upper portion **145** of the first intermediate seal **38** and the upper portion **145**B of the second intermediate seal **46** are generally aligned with the top edges **184**, **184**B of the first and second plates **52**, **54**, respectively. In turn, the openings **148**, **148**B of the first and second intermediate seals **38**, **46** are aligned with each other and are positioned below the bottom edges **186**, **186**B of the first and second plates **52**, **54**.

As shown in FIG. **10**, in some embodiments, the openings **148**, **148**B of the first and second intermediate seals **38**, **46**; the openings **160**, **160**B of the first and second spacers **40**, **48**; and the opening **240** combine to define the lower manifold **74** and the spacing, or gap **242**, between the first and second plates **52**, **54** defines the upper manifold **72** and the outlet **78**. In some embodiments, the thickness of the inner seal **58** is selected to control the thickness of the gap **242**. For example, the thickness of the inner seal **58** is optionally substantially uniform such that the gap **242** is substantially vertical in orientation and is substantially uniform, or continuous in thickness.

In some embodiments, the outer, side edges **188**, **188**B and **190**, **190**B are sealed such that a substantially thin, vertical chamber—the upper manifold **72**—is formed between the first and second plates **52**, **54**; a thin, elongate inlet into the upper manifold **72** is formed, or otherwise defined, along the bottom edges **186**, **186**B of the first and second plates **52**, **54**; and the outlet **78** from the upper

manifold **72** formed, or otherwise defined, along the top edges **184**, **184**B. In particular, a substantial perimeter portion of the first and second plates **52**, **54** is sealed together to form the upper manifold **72** with the gap **242** defined between the first and second plates **52**, **54**.

In some embodiments, the gap **242** is substantially elongate and continuous at the top edges **184**, **184**B of the first and second plates **52**, **54** such that the outlet **78** is substantially continuous and elongate. The gap **242** is optionally substantially continuous between the first and second plates **52**, **54** (from top-to-bottom and from side-to-side), although non-uniform spacing between the first and second plates **52**, **54** is also contemplated (e.g., a top profile of the gap **242** at the top edges **184**, **184**B is substantially thin and rectangular according to some embodiments, although a gap that increases in thickness along its length, or sinusoidal, jagged, or other profiles are contemplated to modify flame shape and/or other flame and visual characteristics).

In some embodiments, the outlet **78** extends without interruption for a length of about 33.5 inches at the top edges **184**, **184**B at a thickness of about 0.06 inches, for example, although a variety of dimensions are contemplated. For example, in some embodiments, the outlet **78** is less than about 0.5 inches thick. In some other embodiments, outlet thicknesses from about 0.03 inches to about 0.125 inches or from about 0.01 inches to about 0.25 inches is contemplated. A variety of lengths are also contemplated, including the outlet **78** extending continuously without interruption for greater than about 1 inch, for greater than about 3 inches, from about 3 inches to about 48 inches, greater than about 12 inches, or greater than about 24 inches, for example.

In some embodiments, the upper manifold **72** is from about 3 inches long to about 48 inches long, is from about 3 inches in height to about 36 inches in height, and is from about 0.03 inches in thickness, or depth, to about 0.125 inches in thickness or from about 0.01 inches in thickness to about 0.25 inches in thickness, for example. In turn, the lower manifold **74** is from about 1 inches in height to about 3 inches in height; is from about 0.25 inches in thickness to about 2 inches in thickness; and is from about 3 inches long to about 48 inches long, for example, although a variety of dimensions are clearly contemplated.

As shown in FIG. **10**, the inner face **92** of the first frame member **30** is abutted against the first intermediate seal **38**, and the inner face **122** of the second frame member **32** is abutted against the second intermediate seal **46**. In some embodiments, the outer perimeters of the first and second frame members **30**, **32**; the first and second intermediate seals **38**, **46**; the first and second spacers **40**, **48**; the first and second plates **52**, **54**; and the inner seal **58** each are substantially aligned with one another. In particular, the fastener holes **98**, **128** (FIG. **2**) of the first and second frame members **30**, **32**; the fastener holes **147**, **147**B of the first and second intermediate seals **38**, **46**; the fastener holes **159**, **159**B of the first and second spacers **40**, **48**; and the fastener holes **208** of the inner seal **58** are all aligned with one another such that the plurality of fasteners **70** are inserted through corresponding fastener holes to secure the burner assembly **18** together.

The connector **62** is secured to the opening **102** of the first frame member **30**. In particular, the flange **212** (FIG. **2**) is secured to the outer face **90** to place the connector **62** in communication with the lower manifold **74** (FIG. **10**) and, thus, the upper manifold **72**. The igniter **66**, or ignition device, is mounted to the pair of tabs **101** of the first frame member **30** adjacent the outlet **78** and is adapted to ignite combustible gases emanating from the outlet **78**. In other embodiments, however, the igniter **66** or an additional or alternate ignition device is mounted in the path of combustible gases into the burner assembly **18** prior to the gases entering the burner assembly **18** such that flames **22** travel up into the upper manifold **72** and/or lower manifold **74**. For example, in some embodiments, the igniter **66** is optionally mounted in the path of gas flow between the gas source **16** and the lower manifold **74**. The flames **22** are viewable in the upper manifold **72** through the first and second plates **52**, **54** according to some embodiments.

As shown in FIG. **1**, positioning of the burner assembly **18** in the fireplace **10** according to some embodiments includes releasably securing the feet **100** (FIG. **3**) and **130** (FIG. **4**) of the burner assembly **18** into a lower portion of the combustion chamber **14** such that the burner assembly **18** is substantially vertically oriented. In some embodiments, the burner assembly **18** is positioned in the fireplace **10** with the top edges **184**, **184**B of the first and second plates **52**, **54** disposed in a middle portion **300** of fireplace **10**, such that the first and second plates **52**, **54** are exposed through a transparent portion **24** of the fireplace **10** while a remainder of the burner assembly **18** is substantially hidden from view by a surrounding, non-transparent portion **24**B of the fireplace **10**.

The connector **62** is placed in communication with the gas source **16**, including any flow regulators, means for varying air-to-gas mixture ratios, or other equipment feeding the burner assembly **18** through the connector **62**.

Where the first and second plates **52**, **54** (FIG. **2**) are substantially transparent, the visibility of the burner assembly **18** is greatly reduced, such that the burner assembly **18** is substantially hidden from view. For example, where the first and second plates **52**, **54** are formed of a substantially clear material, light is able to pass through the central viewing area **88**, into the first and second plates **52**, **54**, and out through the central viewing area **88**B.

In some embodiments, this lends an appearance that a source of the flames **22** is substantially hidden. This hidden-source feature is useful in various scenarios, including creating a more realistic look with a log set or an eye-catching visual effect like that generally shown in FIGS. **1** and **12**. In some embodiments, the top edges **184**, **184**B (FIG. **2**) of the first and second plates **52**, **54** define a light (i.e., harder to perceive) visual horizon with the first and second plates **52**, **54** being transparent and less visible. In other embodiments, the top edges **184**, **184**B are not generally visible to the naked eye.

In some embodiments, the burner assembly **18** is used in a method of producing the flames **22** to produce a substantially continuous, uninterrupted body of flames **22** extending across the outlet **78** at the top edges **184**, **184**B. In contrast to burners with a multitude of distinct holes for delivering combustible gases, the burner assembly **18** optionally provides a single, substantially thin and elongate outlet **78** from the burner assembly **18** for generating the flames **22**. For example, the gap **242** and resulting outlet **78** are optionally selected to provide means for forming a substantially continuous body of flames **22** across the upper portion of the burner assembly **18**. It should also be understood that a spacing, length, and shape (e.g., top profile) of the gap **242** and outlet **78** are selected to provide various BTUs from the burner assembly **18** as desired.

In some embodiments, the burner assembly **18** is used to create an effect whereby the flames **22** race from the first side **26** of the burner assembly **18** to the second side **28** of the burner assembly **18**. In particular, by locating the igniter **66** at the first side **26** of the burner assembly **18** the flames **22** start at the first side **26** and travel to the second side **28**.

In still other embodiments, an additional igniter **66** is placed at the second side **28** of the burner assembly **18** to provide further versatility in a direction the flames **22** travel across the outlet **78** (e.g., left-to-right, right-to-left, and/or meeting-in-the-middle effects).

FIG. **12** is a front view of the fireplace **10** illustrating one visual effect accomplished according to various embodiments—a see-through effect where the burner **18** is substantially see-through and hidden from view. As shown in FIG. **12**, a viewer (not shown) is able to see into the combustion chamber **20**, through the fireplace **10** (including the burner **18**), and to the other side of the fireplace **10**. The visual impact of the burner **18** (FIG. **1**) is substantially reduced such that the burner **18** is substantially hidden and the flames **22** "appear in mid-air." From this description, a variety of variations and augmentations of such see-through viewing effects should become apparent.

FIG. **13** is a side view of another fireplace **310**, according to some embodiments. In various embodiments, features described in association with the fireplace **10** and the fireplace **310** are interchangeable as desired. In some embodiments, the fireplace **310** includes a housing **312**, a vent assembly **318**, a front panel **320**, a rear panel **322**, and the burner assembly **18**. In some embodiments, a viewer is able to view fireplace flames (not shown) by looking into the fireplace **310** from a first side **310**A and/or a second side **310**B of the fireplace, where the at least one of the front and rear panels **320**, **322** allow viewing into the fireplace **310**.

As shown, the fireplace **310** has a substantially thin profile, although thicker, more traditional fireplace designs are contemplated. In some embodiments the fireplace **310** includes features for creating reflective visual effects. For example, one or both of the front and rear panels **320**, **322** are optionally formed of a reflective material, such as a one-way reflective material (e.g., Mirropane™ materials available from Toledo-Pilkington North America Inc. of Toledo, Ohio).

In some embodiments, the front panel **320** includes an outer surface **320**A and in inner surface **320**B, the front panel **320** being reflective at the inner surface **320**B and allowing viewing into the fireplace **310** through the outer surface **320**B. In some embodiments, the rear panel **322** includes an outer surface **320**A and an inner surface **320**B having substantially similar properties to those of the front panel **320**, where the outer surface **322**A allows viewing into the fireplace **310** and the inner surface **322**B provides reflective properties. In still other embodiments, the inner surface **322**B is reflective and the outer surface **322**A is substantially opaque. As shown, the inner surfaces **320**B, **322**B of the front and rear panels **320**, **322** are oriented inwardly, toward one another and the outer surfaces **320**A, **322**B face away from one another.

In some embodiments, light from fireplace flames generated by the burner **18** (not shown) is reflected back and forth by the reflective inner surfaces **320**B, **322**B as represented by the arrow **330** to create a reflective visual effect, such as an "infinity effect." In particular, in some embodiments, the fireplace **310** is adapted to create an illusion of depth using the infinity effect, where to a viewer it appears there are a series of layers of flames emanating from within the fireplace **310** due to the repeated reflection of the flames by the inner surfaces **320**B, **322**B. Thus, one method of presenting fireplace flames to a user for viewing includes optically reflecting flames to create the illusion of a plurality of flames within the fireplace **310** that are not otherwise actually present. In some embodiments, the optical effect shifts and moves depending on the viewer's viewing angle. Additionally, the inner surfaces **320**B, **322**B are optionally substantially parallel with one another, or can be angularly offset to vary a generated optical, or visual effect as desired.

Viewing panels having reflective properties can be utilized to achieve a variety of other, additional or alternative effects. For example, in some other embodiments, one or both of reflective surfaces **320**B, **322**B are oriented outwardly, toward a user, and the front and/or rear panels **320**, **322** are adapted such that when turned off, a viewer sees an external, reflective surface substantially similar to a mirror, for example. When turned on, however, the front and/or rear panels **320**, **322** become substantially see-through due to the internal light generated by the flames, allowing viewing of the flames generated in the fireplace **310**. Thus, in one method of using the fireplace **310**, the interior of the fireplace **310** is substantially obscured from view as desired (e.g., when not in operation) and, for example, even though a room in which the fireplace **310** is installed is illuminated. Additionally or alternatively, an internal light set (e.g., including light bulbs) is optionally used inside the fireplace to illuminate the interior and allow viewing through the reflective surface(s).

FIG. **14** is a top view of the fireplace **310**, according to some embodiments, where the vent assembly **318** includes an outer duct member **338** and an inner duct member **340** centrally disposed within the outer duct member **338**. Although in FIG. **13**, the vent assembly **318** is shown as being cut off, the vent assembly **318** optionally includes a short, vent connector secured to the fireplace **310** as well as a longer run of associated duct work having a substantially similar configuration to that of the vent connector (inner and outer duct members having similar sizes and shapes to that of the vent connector).

In some embodiments, the vent assembly **318** is particularly useful for installation in a relatively thin wall **344**. Generally, the wall **344** is formed by a plurality of structure members **346** (e.g., wall studs) and appropriate facing members **348** (e.g., dry wall). The outer and inner duct members **338**, **340** are substantially rectangular in shape, helping to allow the outer profile of the vent assembly **318** to be reduced while retaining sufficient air flow space (e.g., relative to traditional, round vent assembly designs). In particular, the outer and inner duct members **338**, **340** each define a substantially thin rectangular profile and are secured relative to one another to form an air gap between them. In some embodiments, the air gap between the outer and inner duct members **338**, **340** acts as a plenum for supplying fresh air into the fireplace **310** and the inner duct **340** provides a plenum for taking exhaust air out of the fireplace **310**, the vent assembly **318** being in communication with a combustion chamber of the fireplace **310** and air supply plenum(s) of the fireplace **310**.

In some embodiments, the vent assembly **318** is adapted to be installed in wall **344** having an open interior about 5.5 inches thick, for example, such as that formed using a standard 2 inch×6 inch wall stud configuration. In particular, the dimensions of the outer duct **338** and inner duct **340** are selected to allow sufficient spacing between structure members **346** and facing members **348** of the wall **344** to prevent overheating or address other building and safety concerns, while providing sufficient air flow into and out of the fireplace **310**.

In view of the foregoing, in some embodiments the fireplace **10** is optionally substantially thin, overall, and installed in a standard wall **344** (e.g., a 2×6 stud wall) with the narrow vent assembly **318** being hidden within the wall **344**. If desired, the fireplace **10** includes the middle portion

300 of the fireplace being substantially transparent from front-to-back, as well as the first and second plates **52**, **54** being substantially transparent, such that the fireplace **10** provides a viewing window through the wall **344** (shown with buildings in the background) that is at least largely unobscured by the burner assembly **18** as shown in FIG. **12**.

Although the burner assembly **18** is shown and described with substantially rectangular first and second plates **52**, **54**, in other embodiments the plates **52**, **54** take a variety of shapes. For example, another burner assembly **418** is shown in FIG. **15** having substantially arcuately shaped plates (only a first plate **420** is visible in FIG. **15**) where flames (not shown) would be emitted along a substantially elongate arcuate path. As another example, FIG. **16** shows another burner assembly **518** with plates **520** defining a double curve profile where flames (not shown) would be emitted along a substantially elongate, double curve profile. As still another example, FIG. **18** shows another burner assembly **618** with plates **620** having an angular, double peaked profile where flames (not shown) would be emitted along substantially elongate, double peak profile. Moreover, and as described in greater detail below, the frame members and seals, though described and referenced in the drawings according to some embodiments as substantially U-shaped can take a variety of shapes and forms as appropriate.

FIG. **18** shows another heating unit **1010** including an outer housing **1012**, a gas source **1016**, and a burner assembly **1018**. As shown, the heating unit **1010** is configured as a table, or stand. In other embodiments, the heating unit **1010** is configured as a fireplace or gas campfire, for example. If desired, flame accessories **1019** such as glass pieces, rocks, synthetic embers, or others are supported on the burner assembly **1018** as shown in FIG. **18**. Though some configurations and components are shown and described in association with the heating unit **1010**, various features of the heating unit **1010** are interchangeable as desired with features of the various embodiments described herein.

The outer housing **1012** is formed of any of a variety of suitable materials, including formed sheet metals or anodized aluminum, for example. The outer housing **1012** includes a plurality of legs **1020** and a support frame **1022** having an open interior **1022**A through which the burner assembly **1018** is viewable, where one of the plurality of legs **1020** secured at each corner of the support frame **1022** to support the heating unit **1010**. Although the support frame **1022** is shown as substantially rectangular in shape, the support frame **1022** optionally takes on a variety of shapes, including circular or oval, for example.

In some embodiments, one side or corner of the outer housing **1012** is raised or elevated relative to a remainder of the housing **1012**. For example, a first leg **1020** A is substantially longer (e.g., from about 0.25 inches to about 1 inch) than the remaining legs **1020**. In outer door applications, the raised corner **1022**B helps move water toward a burner conduit at the opposite corner of the housing **1012** where the water is collected in a water trap or is allowed to drain out of the appliance **1010**. Alternatively or additionally, a cover (not shown) is optionally employed to reduce water ingress as desired.

As shown in FIG. **18**, the gas source **1016** is a portable LP tank with an associated regulator and tubing, such as those used in association with gas grills, for example. In other embodiments, the gas source **1016** includes a regulator connected to an external gas line, such as a natural gas or LP gas line associated with residential, commercial, or other structure. Gases other than natural gas or propane are also contemplated, such as hydrogen, for example.

FIG. **19** is a perspective view of the burner assembly **1018**, according to some embodiments. As shown in FIG. **19**, the burner assembly **1018** defines a width between a first side **1024**A and a second side **1024**B that is opposite the first side **1024**A; a length between a first end **1026**A and a second end **1026**B that is opposite the first end **1026**A; and a thickness between a first face **1028**A and a second face **1028**B (FIG. **22**) that is opposite the first face **1028**A.

As shown in FIG. **19**, the first face **1028**A corresponds to a top of the burner assembly **1018** (a portion that normally faces up), although in other embodiments the first face **1028**A corresponds to a front, back, or side of the burner assembly **1018** or even a bottom of the burner assembly **1018**, for example. In some embodiments, the burner assembly **1018** is about 37 inches long, about 19 inches wide, and about 2 inches thick, although a variety of dimensions are contemplated. Although the burner assembly **1018** is shown in a rectangular configuration, any of a variety of other shapes are also contemplated, including circular, octagonal, irregular, or other shapes.

FIGS. **20** and **21** are perspective views of components of the burner assembly **1018** in an unassembled state. In some embodiments, FIG. **20** corresponds to a downward-looking perspective view while FIG. **21** corresponds to an upward-looking perspective view. As shown, the burner assembly **1018** includes a first frame member **1030**, a second frame member **1032**, a first intermediate seal **1038**, a first spacer **1040**, a second intermediate seal **1046**, a second spacer **1048**, a first plate **1052**, a second plate **1054**, a third plate **1056**, an inner seal **1058**, a connector **1062**, and a plurality of fasteners **1070**, the fasteners optionally being similar to the fasteners **70** previously described. In some embodiments, the burner assembly **1018** includes an igniter (not shown) such as those previously described. In other embodiments, a user (not shown) of the heating unit **1010** uses a hand held igniter to light the heating unit **1010**.

As described in greater detail, below the spacers **1040**, **1048** and frame members **1030**, **1032** provide means for supporting the plates **1052**, **1054**, **1056** in an opposed relationship while the seals **1038**, **1046**, **1058** provide means for sealing the space between the plates **1052**, **1054**, **1056** (e.g., by forming a perimeter seal about the plates **1052**, **1054**, **1056**) to form inlet/outlet chambers of the burner assembly **1018**.

In some embodiments, various components of the burner assembly **1018** are sandwiched together to form a substantially thin, or slim burner structure (e.g., about 1 to 3 inches thick overall) with the fasteners **1070** securing the structure together. Generally, the first and second frame members **1030**, **1032** (as well as the seals **1038**, **1046** and spacers **1040**, **1048**) form a housing around the first, second, and third plates **1052**, **1054**, **1056**. As described in greater detail, the burner assembly **1018** forms an outlet chamber **1072** (FIG. **23**) that is relatively thin (e.g., about 0.5 inches, 0.25 inches, 0.125 inches, 0.06 inches, or 0.01 inches) and an inlet chamber **1074** (FIG. **23**) in communication with the outlet chamber **1072** that is also relatively thin, where the chambers **1072**, **1074** are also optionally described as manifolds or plenums, for example. The inlet chamber **1074** helps provide an inlet **1076** (FIG. **23**) into the outlet chamber **1072** and the outlet chamber **1072** provides an outlet **1078** (FIG. **23**) from the burner assembly **1018**. As with various embodiments previously described, the thin chamber design can be advantageous from a gas distribution perspective; facilitate

compact, or thin line designs; and/or be used to produce visually unique optical effects.

As shown, the first frame member **1030** includes a first end member **1080**, also described as a side portion or upright, a second end member **1082**, a first lateral member **1084**, also described as a side portion, extending between the first and second end members **1080**, **1082**, and a second lateral member **1086** extending between the first and second end members **1080**, **1082**, where the first end member **1080**, the second end member **1082**, the first lateral member **1084**, and the second lateral member **1086** define a central viewing area **1088**. The first frame member **1030** also defines an outer face **1090** (FIG. **21**), an inner face **1092**, and has a plurality of fastener holes **1098**.

In some embodiments, the first frame member **1030** includes a set of feet **1100** for securing the burner assembly **1018** to other components such as the outer housing **1012**.

In some embodiments, the inner face **1092** of the first frame member **1030** is optionally substantially planar overall. In some embodiments, the first end member **1080** includes features (e.g., one or more tabs) adapted to maintain an igniter (not shown). The first lateral member **1084** is optionally positioned on the first side **1024**A (FIG. **19**) of the burner assembly **1018** and the second lateral member **1086** is optionally positioned on the second side **1024**B of the burner assembly **1018**. In some embodiments, the first lateral member **1084** has an opening **1102** for forming a gas inlet plenum, for example, as is subsequently described. The opening **1102** is about 1.25 inches in diameter, for example, although other dimensions are contemplated.

Though a variety of materials and forming processes are contemplated, the first end member **1080**, the second end member **1082**, and the first and second lateral members **1084**, **1086** are optionally formed from a single piece of sheet metal or other material using bending and/or stamping processes, for example. The first end member **1080**, the second end member **1082**, and the first and second lateral members **1084**, **1086** combine to form a substantially square frame, where the central viewing area **1088** is defined on four sides by the first and second end members **1080**, **1082**, and the first and second lateral members **1084**, **1086**.

As shown, the second frame member **1032** is substantially complementary in configuration to the first frame member **1030** and includes a first end member **1110**, also described as a side portion or upright, a second end member **1112**, a first lateral member **1114**, also described as a side portion, extending between the first and second end members **1110**, **1112**, and a second lateral member **1115** extending between the first and second end members **1110**, **1112**, where the first and second end members **1110**, **1112** and the first and second lateral members **1114**, **1115** define a central viewing area **1116**.

The second frame member **1032** also defines an outer face **1120** and an inner face **1122** (FIG. **21**) and has a plurality of fastener holes **1128**. The inner face **1122** of the second frame member **1032** is optionally substantially planar overall. In some embodiments, similar forming processes and materials to those of the first frame member **1030** are used to form the second frame member **1032**. The first end member **1110**, the second end member **1112**, the first lateral member **1114**, and the second lateral member **1115** combine to form a substantially rectangular frame, where the central viewing area **1116** is defined on four sides by the first end member **1110**, the second end member **1112**, and the lateral members **1114**, **1115**.

The various seals/spacers are described below and referenced in the drawings as pre-formed pieces (e.g., being molded, stamped, or cut out) of material, such as silicone. In some embodiments, however, one or more of the seals/spacers are deposited or applied as liquids or gels that cure or are otherwise formed.

The first intermediate seal **1038** is optionally formed as a single piece of gasket material (e.g., high-temp silicone gasket material), or any other suitable material. In some embodiments, the first intermediate seal **1038** is about 0.125 inches thick, although a variety of dimensions (e.g., from about 0.1 inches to about 0.8 inches thick) are contemplated. The first intermediate seal **1038** includes a first arm **1140**, or first end portion, a second arm **1142**, or second end portion, a first edge portion **1144**, and a second edge portion **1145** each connecting the first and second arms **1140**, **1142**. The first intermediate seal **1038** is substantially rectangular, for example, defining an open interior **1146** bounded by the first arm **1140**, the second arm **1142**, and the edge portions **1144**, **1145** and has a plurality of fastener holes **1147** disposed about the first intermediate seal **1038**.

The first edge portion **1144** has an opening **1148** which, as described in greater detail below, helps provide means for forming a gas inlet plenum. As shown, the opening **1148** is substantially rectangular in shape and from about 33 to about 35 inches long and from about 1 to about 3 inches wide (e.g., about 2 inches wide), although a variety of shapes and dimensions are contemplated. The first edge portion **1144** has a first piece **1149** on one side of the opening **1148** toward the open interior and a second piece **1150** on an opposite side of the opening **1148** toward the outer perimeter of the first intermediate seal **1038**. The open interior **1146** is sized to be substantially smaller than the first plate **1052** such that the first arm **1140**, the second arm **1142**, the first piece **1149** and the second edge portion **1145** are sized to overlap the first plate **1052** as received in the first spacer **1040** and as described in greater detail below.

The second intermediate seal **1046** is substantially similar to the first intermediate seal **1038**, according to some embodiments. As such, where features of the second intermediate seal **1046** are described and referenced in the drawings they are designated by a similar reference number to the first intermediate seal **1038** followed by a "B."

In some embodiments, the first spacer **1040** is formed as a single piece of material. In some embodiments, the first spacer **1040** is adapted to support the first plate **1052** and/or to provide anchor points for fastening the various burner components together without unduly stressing the first plate **1052**. For example, the first spacer **1040** is formed of steel or another sufficiently rigid material (e.g., polymeric or metallic materials) for receiving and supporting the first plate **1052** and/or providing suitable assembly anchor points. In some embodiments, the first spacer **1040** is about 0.25 inches thick, although a variety of dimensions are contemplated (e.g., from about 0.1 to about 0.5 inches thick). In some embodiments, the first spacer **1040** has about the same thickness as the first plate **1052**.

The first spacer **1040** includes a first arm **1152**, also described as a side portion, a second arm **1154**, a first leg **1156**, also described as a side portion, connecting the first and second arms **1152**, **1154**, and a second leg **1157** connecting the first and second arms **1152**, **1154**. In some embodiments, the first spacer **1040** is substantially rectangular, defining an open interior **1158** bounded by the first arm **1152**, the second arm **1154**, and the first and second legs **1156**, **1157**. The open interior **1158** is sized to be substantially complementary in size to the first plate **1052**, such that the first plate **1052** is able to be received in the open interior **1158** in a substantially complementary fit. The first spacer

1040 also includes a plurality of fastener holes 1159 disposed about the first spacer 1040.

The first edge portion 1156 has an opening 1160 (FIG. 21) which, as subsequently described, helps provide means for forming a lower chamber, or plenum of the burner assembly 1018. As shown, the opening 1160 is substantially rectangular in shape and from about 33 to about 35 inches long and about 2 inches wide, although a variety of shapes and dimensions are contemplated (e.g., from about 1 inch to about 3 inches in width). As shown, the first edge portion 1156 defines a first piece 1162 toward the open interior 1158 and a second piece 1164 opposite the first piece 1162.

The second spacer 1048 is substantially similar to the first spacer 1040, according to some embodiments. As such, where features of the second spacer 1048 are described and referenced in the drawings they are designated by a similar reference number to the first spacer 1040 followed by a "B."

In some embodiments, the first plate 1052 is substantially rectangular in shape, having a length of from about 33 to about 35 inches, a width of about 14 inches, and a thickness of about 0.25 inches, although a variety of dimensions are contemplated (e.g., a plate thickness from 0.1 to about 0.5 inches). The first plate 1052 is optionally formed of ceramic glass, or other suitable material.

In some embodiments, the first plate 1052 is formed of a substantially transparent, or see-through material (e.g., ceramic glass) such that light is able to pass through the first plate 1052. Additionally, or alternatively, the first plate 1052 is formed of substantially reflective material (e.g., a material such as Mirropane™ available from Toledo-Pilkington North America Inc. of Toledo, Ohio) or other materials. In still other embodiments, the first plate 1052 is formed of opaque materials, such as marble, sheet metal, or others.

The first plate 1052 defines an outer face 1180 (FIG. 21), an inner face 1182, a first side edge 1184 along a first side portion 1185 of the first plate 1052, a second side edge 1186 along a second side portion 1187 of the first plate 1052, a first end edge 1188 along a first end portion 1189 of the first plate 1052, and a second end edge 1190 along a second end portion 1191 of the first plate 1052.

In some embodiments, the inner and/or outer faces 1180, 1182 of the first plate 1052 are substantially planar, where the inner and/or outer faces 1180, 1182 are optionally smooth (e.g., as with typical sheet glass) or include surface features (e.g., bumps, ridges, dimpling, facets, or other features) while being considered substantially planar. In some other embodiments, the inner and/or outer faces 1180, 1182 are not substantially planar (e.g., including larger-scale waves or bends). For example, the first, second, and third plates 1052, 1054, 1056 are optionally substantially S-shaped and fit together, at a spaced relationship, in a complementary manner.

The second and third plates 1054, 1056 are each generally similar to the first plate 1052, according to some embodiments, though, as shown, of different dimensions than the first plate 1052. For example, in some embodiments, the second and third plates 1054, 1056 are each substantially the same length and thickness as the first plate 1052 and one or both of the second and third plates 1054, 1056 is less than half the width of the first plate 1052. In some embodiments, the second plate 1054 defines an inner edge 1192, also described as a terminal edge, and an outer edge 1194, also described as a perimeter edge, as well as an inner face 1195A (FIG. 21) and an outer face 1195B. In turn, in some embodiments, the third plate 1056 defines an inner edge 1196, also described as a terminal edge, and an outer edge 1198, also described as a perimeter edge as well as an inner face 1199A and an outer face 1199B. As described in greater detail below, once the burner assembly 1018 is assembled, the second and third plates 1054, 1056 are positioned in a common plane with a space between the inner edges 1192, 1196 forming the outlet 1078 (FIG. 23) from the burner assembly 1018.

As shown, the inner seal 1058 optionally includes a primary gasket 1058A, a plurality of edge spacers 1058B, and a plurality of washers 1058C. Note that the inner seal 1058 is shown above the second and third plates 1054, 1056 in FIGS. 20 and 21, although upon assembly the inner seal 1058 resides between the first plate 1052 and the second and third plates 1054, 1056 as subsequently described. In some embodiments, the primary gasket 1058A is made of a compressible gasket material, such as a high temperature foamed silicone. In turn, the edge spacers 1058B and the washers 1058C are optionally made of higher durometer material, such as a high temp silicone, to help better serve a spacing function between the first and second plates 1052, 1054 and first and third plates 1052, 1056. As described in greater detail below, the inner seal 1058 helps seal the first plate 1052 and the second and third plates 1054, 1056, as well as the first and second spacers 1040, 1048, as well as maintain spacing between the first plate 1052 and the second and third plates 1054, 1056.

In some embodiments, the primary gasket 1058A is about 0.06 inches thick, although a variety of dimensions are contemplated (e.g., from about 0.01 inches to about 0.25 inches thick). The primary gasket 1058A includes a first leg 1200, or first edge portion, a first arm 1202, or first end portion, a second arm 1204, or second end portion, and a second leg 1206, or second edge portion, where the first leg 1200 and the second leg 1206 extend between the first and second arms 1202, 1204. The primary gasket 1058A also includes a plurality of fastener holes 1208 disposed about the primary gasket 1058A.

The primary gasket 1058A is substantially rectangular, defining an open interior 1210 bounded by the first leg 1200, the first arm 1202, the second arm 1204, and the second leg 1206. In some embodiments, the open interior 1210 is sized to be shorter than the first plate 1052 and shorter than the spaced, second and third plates 1054, 1056, such that the first and second arms 1202, 1204 are sized to abut the first plates 52, 54 upon assembly of the burner assembly 18. In turn, the open interior 202 is wider than the first plate 1052, as well as the wider than the spaced-pair of second and third plates 1054, 1056, in order to leave a space next to the first side edge 1184 of the first plate 1052 and the outer edge 1194 of the second plate 1054. In particular, in some embodiments, the first and second arms 1202, 1204 are adapted to overlap to some extent the first plate 1052, the second plate 1054, and the third plate 1056, while the first leg 1200 resides below the first and second plates 1052, 54 at an offset from the first side edge 1184 and the outer edge 1194 of the first and second plates 52, 54, respectively. In some embodiments, the first leg 1200 is about 0.6 inches wide, although other dimensions are contemplated.

The edge spacers 1058B are adapted to be positioned between the first plate 1052 and the second plate 1054 and the first plate 1052 and the third plate 1056 next to the inner faces 1182, 1195A, 1199A of the plates along the first end edge 1188 and the second end edge 1190 of the first plate 1052. In turn, the washers 1058C are positioned at locations corresponding to the various fastener holes so that they partially project between the first plate 1052 and the second plate 1054 at the first side edge 1184 and the outer edge 1194

and between the first plate **1052** and the third plate **1056** at the second side edge **1186** and the outer edge **1198**.

As subsequently described, the washers **1058**C are held in position with the fasteners **1070** and help ensure that the relatively softer primary gasket **1058**A is not compressed more than desired upon tightening the fasteners **1070**. The edge spacers **1058**B optionally serve a substantially similar function, being of a substantially similar thickness and/or material as the washers **1058**C.

As shown, in some embodiments the connector **1062**, also described as a conduit, is substantially similar to the connector **62**. Additionally, the fasteners **1070** are optionally substantially similar to the fasteners **70**.

FIG. **19** is a perspective view of the burner assembly **1018** in an assembled state from a top-down perspective and FIG. **22** is a perspective view of the burner assembly **1018** from a bottom-up perspective, according to some embodiments. FIG. **23** is a cross-sectional view of a portion of the burner assembly **1018** without the connector **1062** along line **23-23** shown in FIG. **22**, according to some embodiments. Reference can be made between the unassembled, exploded views of FIGS. **20** and **21** and the assembled views of FIGS. **19** and **22-24** as appropriate to assist in understanding some methods of assembling the burner assembly **1018**.

In some embodiments, assembly includes disposing the first spacer **1040** about the first plate **1052**, with the first plate **1052** received in the open interior **1158** of the first plate **1052**. The first spacer **1040** is optionally about the same thickness as the first plate **1052**. In turn, the second and third plates **1054**, **1056** are received in an open interior **1158**B of the second spacer **1048**, the second spacer **1048** optionally being about the same thickness as each of the second and third plates **1054**, **1056**.

In some embodiments, the first and second spacers **1040**, **1048** are aligned to one another and are disposed opposite one another with the first plate **1052** disposed opposite the second and third plates **1054**, **1056** in a substantially parallel, spaced relationship. As shown, the inner edges **1192**, **1196** of the second and third plates **1054**, **1056** are spaced from one another to define the outlet **1078** from the burner assembly **18** and the outer edges **1194**, **1198** are substantially aligned with the first plate **1052**.

The edge spacers **1058**B are positioned between the first plate **1052** and the second plate **1054** and between the first plate **1052** and the third plate **1056** along the first and second end edges **1188**, **1190** of the first plate **1052**. In turn, the washers **1058**C are distributed about the perimeter of the first plate **1052**, extending partially between the first and second spacers **1040**, **1048** and partially between the first plate **1052** and the second plate **1054** along the first side edge **1184** as well as partially between the first and third plates **1052**, **1056** along the second side edge **1186**.

In some embodiments, the primary gasket **1058**A is received between the first and second spacers **1040**, **1048** to help seal the spacers **1040**, **1048** together and the plates **1052**, **1054**, **1056** together. The primary gasket **1058**A seals against the lower pieces **1156**, **1156**B of the first and second spacers **1040**, **1048** leaving an opening **1240** (FIG. **23**) that corresponds to the openings **1160**, **1160**B of the first and second spacers **1040**, **1048** and helps define the inlet chamber **1074**.

In some embodiments, the primary gasket **1058**A is substantially compliant, helping reduce effects of irregularities, misalignment, and/or stress concentrations on the plates **1052**, **1054**, **1056** and spacers **1040**, **1048**. Where the plates **1052**, **1054**, **1056** are formed of glass or other ceramic material, such compliance is useful to prevent cracking of the plates **1052**, **1054**, **1056**. Additionally or alternatively, the relatively harder first and second spacers **1040**, **1048** as well as the edge spacers **1058**B and washers **1058**C optionally assist in this regard (e.g., by helping ensure regular spacing between the plates and/or other components of the burner assembly **18**).

In some embodiments, the primary gasket **1058**A additionally extends between the inner faces **1182**, **1195**A of the first and second plates **1052**, **1054** and between the inner faces **1182**, **1199**A of the first and third plates **1052**, **1056** along the first end edge **1188**, the second end edge **1190**, and the second side edge **1186** of the first plate **1052**.

In some embodiments, the first and second edge portions **1144**, **1145** and the first and second arms **1140**, **1142** of the first intermediate seal **1038** are aligned with the first and second arms **1152**, **1154** and the first and second legs **1156**, **1157** of the first spacer **1040**. In turn, the first and second edge portions **1144**B, **1145**B and the first and second arms **1140**B, **1142**B of the second intermediate seal **1046** are aligned with the first and second arms **1152**B, **1154**B and the first and second legs **1156**B, **1157**B of the second spacer **1048**. In some embodiments, the first intermediate seal **1038** is abutted against the first spacer **1040** and the outer face **1180** of the first plate **1052** and the second intermediate seal **1046** is abutted against the second spacer **1048** and the outer faces **1195**B, **1199**B of the second and third plates **1054**, **1056**. In particular, the first intermediate seal **1038** substantially overlaps the first spacer **1040** and also overlaps the first plate **1052** toward its outer perimeter and the second intermediate seal **1046** substantially overlaps the second spacer **1048** and also overlaps the second and third plates **1054**, **1056** toward their outer perimeters. For example, according to some embodiments, the open interiors **1146**, **1146**B are sized slightly smaller than the first plate **1052**, as well as the perimeter defined by the first and second plates **1052**, **1054** once spaced from one another as desired.

In some methods of assembly, the inner face **1092** of the first frame member **1030** is abutted against the first intermediate seal **1038**, and the inner face **1122** of the second frame member **1032** is abutted against the second intermediate seal **1046**. In some embodiments, the outer perimeters of the first and second frame members **1030**, **1032**; the first and second intermediate seals **1038**, **1046**; the first and second spacers **1040**, **1048**; the first plate **1052** and the perimeter defined by the first and second plates **1052**, **1054**; and the inner seal **1058** each are substantially aligned with one another. In particular, the fastener holes **1098**, **1128** of the first and second frame members **1030**, **1032**; the fastener holes **1147**, **1147**B of the first and second intermediate seals **1038**, **1046**; the fastener holes **1159**, **1159**B of the first and second spacers **1040**, **1048**; and the fastener holes **1208** of the inner seal **1058** are all aligned with one another such that the plurality of fasteners **1070** are inserted through corresponding fastener holes and tightened to secure the burner assembly **1018** together.

The connector **1062** is secured to the opening **1102** of the first frame member **1030**. In particular, the flange **1212** (FIG. **23**) is secured to the outer face **1090** (FIG. **21**) to place the connector **1062** in communication with the lower chamber **1074** and, thus, the upper chamber **1072**. An igniter, or ignition device (not shown), is mounted as desired (e.g., at the outlet **1078**).

In some embodiments, a substantial perimeter portion of the first plates **1052** and the perimeter defined by the second and third plates **1054**, **1056** are sealed together to form the outlet chamber **1072**. In particular, the perimeter edges of the plates **1052**, **1054**, **1056** are sealed such that a substan-

tially thin gas chamber—the outlet chamber **1072**—is formed between the first and second plates **1052**, **1054** and between the first and third plates **1052**, **1056**. As shown, the outlet **1078** from the outlet chamber **1072** is defined by the space between the inner edges **1192**, **1196** of the second and third plates **1054**, **1056**.

As shown in FIG. **23**, in some embodiments, the openings **1148**, **1148**B of the first and second intermediate seals **1038**, **1046**; the openings **1160**, **1160**B of the first and second spacers **1040**, **1048**; and the opening **1240** combine to define the lower chamber **1074** and the spacing, or gap **1242**, between the first and second plates **1052**, **1054** and between the first and third plates **1052**, **1056** defines the upper chamber **1072**. The thicknesses of the edge spacers **1058**B and washers **1058**C (FIGS. **20** and **21**) and additionally or alternatively the primary gasket **1058**A are selected to control the thickness of the gap **1242** as desired. For example, the thicknesses of the edge spacers **1058**B and washers **1058**C are optionally substantially uniform such that the gap **1242** is substantially uniform, or continuous in thickness. In other embodiments, the plates **1052**, **1054**, **1056** are varied in thickness, the surfaces of one or more of the inner faces **1182**, **1195**A, **1199**A of the plates **1052**, **1054**, **1056** are varied, and/or components of the inner seal **1058** (e.g., the edge spacers **1058**B and washers **1058**C) are varied in thickness to vary the thickness of the gap **1242**.

As shown in FIG. **19**, in some embodiments, the outlet **1078** is substantially elongate, linear, and extends without interruption (e.g., for a length of about 33.5 inches at a width of about 0.06 inches, although a variety of dimensions are contemplated). In some embodiments, the second and third plates **1054**, **1056** are spaced from one another such that the outlet **1078** is less than about 0.5 inches wide, from about 0.03 inches to about 0.125 inches, or from about 0.01 inches to about 0.25 inches, for example, although other dimensions are contemplated. A variety of lengths are also contemplated, including the outlet **1078** extending continuously without interruption for greater than about 1 inch, for greater than about 3 inches, from about 3 inches to about 48 inches, for greater than about 12 inches, or for greater than about 24 inches, for example, although other dimensions are contemplated.

In some embodiments, the upper chamber **1072** is greater than about 1 inch long, is greater than about 3 inches long, is from about 3 inches long to about 48 inches long, is from about 3 inches in width to about 36 inches in width, and the gap **1242** is defined such that the upper chamber **1072** is about 0.03 inches in thickness, or depth, to about 0.125 inches in thickness, or from about 0.01 inches to about 0.25 inches in thickness, for example, although a variety of dimensions are contemplated. In turn, the lower chamber **1074** is from about 1 inch to about 3 inches in width; is from about 0.125 to about 3 inches in thickness, from about 0.25 inches to about 2 inches in thickness, or from about 0.01 to about 0.25 inches in thickness; and is greater than 1 inch in length, is greater than about 3 inches in length, or is from about 3 inches to about 48 inches length, for example, although a variety of dimensions are clearly contemplated.

As shown in FIG. **18**, the burner assembly **1018** is optionally assembled into a table-like configuration by securing the outer housing **1012** to the burner assembly **1018** with the second and third plates **1054**, **1056** remaining exposed and the first plate **1052** optionally being viewable through the second and third plates **1054**, **1056** where the second and third plates **1054**, **1056** are configured to transmit light according to some embodiments and/or reflect light according to others. The second and third plates **1054**, **1056** are optionally thick enough to support typical loads associated with recreational tables (e.g., drinks, books, etc.) and/or flame accessories **1019** such as glass pieces, rocks, synthetic embers, or others. For example, the support frame **1022** is optionally fastened to the burner assembly **1018** using fastening means such as bolts or screws and the plurality of legs **1020** are attached to the support frame **1022** using similar fastening means or other fastening means such as welding. The connector **1062** (FIG. **22**) is placed in communication with the gas source **1016**, including any flow regulators, means for varying air-to-gas mixture ratios, or other equipment feeding the burner assembly **1018** through the connector **1062**. The heating unit **1010** is then lit by sparking or otherwise starting a flame at the outlet **1078** of the burner assembly **1018** (e.g., using an associated igniter such as those previously described or by using a manual igniter).

In some embodiments, the burner assembly **1018** is positioned in the outer housing **1012** such that substantial portions of the plates **1052**, **1054**, **1056** are exposed to a viewer though the open, central portion **1022**A of the outer housing **1012** with a remainder of the burner assembly **1018** substantially hidden from view by the outer housing **1012**. Where the plates **1052**, **1054**, **1056** are substantially transparent or semi-transparent, a viewer is able to see through the burner assembly **1018**. In some designs, the visible impact of the burner assembly **1018** is greatly reduced via such transparency. For example, where the plates **1052**, **1054**, **1056** are formed of a substantially transparent material, light is able to pass through the central viewing area **1088**, through the plates **1052**, **1054**, **1056** and out through the central viewing area **1088**B. In some embodiments, this lends an appearance that a source of the flames **1022** is substantially hidden, the edges of the outlet **1078** having little visual impact. This hidden-source feature is useful in various scenarios, including creating an eye-catching visual effect.

In other embodiments, the plates **1052**, **1054**, **1056** are substantially reflective to add depth perception and/or an infinity effect where dual reflection is employed.

In some embodiments, the burner assembly **1018** is used in a method of producing flames **1022** to provide a substantially continuous, uninterrupted body of flames **1022** extending across the outlet **1078**. In contrast to burners with a multitude of small distinct holes for delivering combustible gases, the burner assembly **1018** optionally provides a single, substantially thin and elongate outlet **1078** or multiple thin and elongate outlets. In at least such manner, the outlet **1078** is optionally selected to provide means for forming a substantially continuous body of flames **1022** across the upper portion of the burner assembly **1018**. It should also be understood that in addition to providing a slim, compact design, the spacing, length, and shape of the gap **1242** are altered as appropriate to provide a desired BTU output from the burner assembly **1018**. Similarly to the burner assembly **18**, an effect whereby the flames **1022** race from one side to the other of the burner assembly **1018** is achieved as desired.

Additional design modifications are contemplated, including orientation of the burner assembly **1018** in a substantially vertical orientation, forming multiple outlets, or forming non-linear outlet profiles. For example, the first plate **1052** is also optionally split into multiple panes to define one or more outlets on an opposite side of the burner assembly **1018** to the outlet **1078**.

As another example, FIG. **24** shows still another burner assembly **2010**. The components of the burner assembly

2010 are optionally substantially similar to the burner assembly 1018 with a modification in the configuration of first and second plates 2052, 2054. In particular, each of the first and second plates 2052, 2054 has a circular opening 2078A defining a thin, continuous and substantially non-linear (e.g., round) outlet 2078, the opening 2078A passing entirely through the burner assembly 2018. Flames (not shown) are generated at the outlet 2078 as desired. In addition to accomplishing a desirable visual effect, in some outdoor applications, rain water or condensation is able to pass through the burner assembly 2018 through the outlet 2078 rather than collecting in the burner assembly 2018. A linear configuration for the outlet 2078 is optionally accomplished by forming a thin, elongate, and substantially rectangular opening in each of first and second plates 2052, 2054 rather than the circular opening shown.

As still another example, FIG. 25 shows yet another burner assembly 3018 having more than two plates, the burner assembly 3018 including first, second and third plates 3052, 3054, 3056 defining a first outlet 3078A between the first and second plates 3052, 3054 and a second outlet 3078B between the second and third plates 3054, 3056. As shown, in some embodiments, the first and second outlets 3078A, 3078B are arranged in a stepped, or staggered fashion to generate sets of flames at different locations. In some embodiments, a single, inlet chamber similar to those previously described feeds into a first outlet chamber between the first and second plates 3052, 3054 and a second outlet chamber between the second and third plates 3054, 3056 such that a single conduit is optionally used to supply gas from the first and second outlets 3078A, 3078B.

As another example, FIG. 26 shows another burner assembly 4018 defining a plurality of relatively smaller, rectangular openings in a second plate 4054 of the burner assembly 4018 and a jagged, irregular opening in the second plate 4054 defining a first plurality of elongate outlets 4078A and a jagged, angular outlet 4078B from the burner assembly 4018.

Although some examples of flame effects and fireplace installations and configurations have been described, it should be understood a variety of different effects, configurations, and combinations thereof are contemplated without departing from the scope of invention. For example, while the embodiments described above refer to particular features, the scope of invention also includes embodiments having different combinations of features and embodiments that do not include all of the described features. Accordingly, the scope of invention is intended to embrace all such alternatives, modifications, and variations as fall within the claims, together with all equivalents thereof.

What is claimed is:

1. A gas burner assembly comprising:

a first sheet having an inner face and an outer face, the first sheet extending a vertical height between a top edge and a bottom edge and extending a horizontal length between a first side edge and a second side edge opposite the first side edge, the first sheet being formed of an at least partially transparent material to form a central viewing window;

a second sheet having an inner face and an outer face, the second sheet extending a vertical height between a top edge and a bottom edge and extending a horizontal length between a first side edge and a second side edge opposite the first side edge;

the first and second sheets being secured relative to one another such that the first and second sheets are separated by a gap that defines a substantially thin manifold between the inner faces of the first and second sheets, wherein an outlet from the substantially thin manifold is formed along the top edge of the first sheet, and wherein the outer faces of the first and second sheets form externally-facing surfaces of the gas burner assembly, such that the gas burner assembly includes a single substantially thin manifold along a plane perpendicular to the horizontal length of the first sheet and the horizontal length of the second sheet;

a conduit in communication with the substantially thin manifold, the conduit being adapted for connection to a source of gas; and

a spacing member located adjacent the first side edge of the first sheet and the first side edge of the second sheet and adjacent the inner faces of the first sheet and the second sheet, wherein the spacing member has a horizontal length that is less than the horizontal length of the first sheet.

2. The gas burner assembly of claim 1, wherein the horizontal length of the spacing member is less than ½ the horizontal length of the first sheet.

3. The gas burner assembly of claim 1, wherein the horizontal length of the spacing member is less than 1/10 the horizontal length of the first sheet.

4. The gas burner assembly of claim 1, wherein the spacing member is a first spacing member, wherein the burner assembly further comprises a second spacing member located adjacent the second side edge of the first sheet and the second side edge of the second sheet and adjacent the inner faces of the first sheet and the second sheet, and wherein the second spacing member has a horizontal length that is less than the horizontal length of the first sheet.

5. The gas burner assembly of claim 4, wherein the first spacing member and the second spacing member are positioned so that a horizontal line intersects the first spacing member and the second spacing member, and wherein the first spacing member and the second spacing member are horizontally separated by a spacer gap.

6. The gas burner assembly of claim 5, wherein the spacer gap has a length that is more than half of the horizontal length of the first sheet.

7. The gas burner of claim 4, further comprising a third spacing member located adjacent the bottom edge of the first sheet and adjacent the inner faces of the first sheet and the second sheet.

8. The gas burner of claim 7, wherein the first spacing member, the second spacing member, and the third spacing member are integrally formed.

9. The gas burner of claim 4, wherein the first spacing member has a vertical height that is greater than half of the vertical height of the first sheet and wherein the second spacing member has a vertical height that is greater than half of the vertical height of the first sheet.

10. The gas burner of claim 1, wherein the spacing member has a vertical height that is equal to the vertical height of the first sheet.

11. The gas burner of claim 1, wherein the spacing member has a vertical height that is greater than half of the vertical height of the first sheet.

12. A gas burner assembly comprising:

a first sheet having an inner face and an outer face, the first sheet extending a vertical height between a bottom edge and a top edge;

a second sheet having an inner face and an outer face, the second sheet extending between a bottom edge and a top edge, the first sheet and the second sheet partially defining an upper manifold having an outlet formed

along the top edge of the first sheet, the first sheet being formed of an at least partially transparent material to form a viewing window, the viewing window forming an externally facing surface of the gas burner assembly;

a lateral frame member located proximate to the bottom edge of the first sheet;

a first vertical frame member located proximate to a first end of the second sheet;

a second vertical frame member located proximate to a second end of the second sheet opposite the first edge of the second sheet, wherein outer surfaces of the lateral frame member, first vertical frame member, and second vertical frame member form externally facing surfaces of the gas burner assembly that frame the viewing window;

a sealing element located between the outer face of the first sheet and the inner face of the lateral frame member, the sealing element defining a boundary of a lower manifold located below the upper manifold; and

a conduit adapted for connection to a source of gas, the conduit adapted to transmit gas from the source of gas to the lower manifold, such that the gas contacts the inner surface of the first sheet adjacent the bottom edge of the first sheet.

13. The gas burner assembly of claim **12**, wherein a width of the lower manifold is greater than a width of the upper manifold.

14. The gas burner assembly of claim **12**, wherein the lateral frame member, the first vertical frame member, and the second vertical frame member are aligned in a plane extending vertically and longitudinally, and wherein the plane includes a central portion void of materials, the central portion being horizontally aligned with the viewing window.

15. The gas burner assembly of claim **12**, wherein the lateral frame member includes feet at a lower portion of the lateral frame member for maintaining the gas burner assembly in the upright position.

16. The gas burner assembly of claim **12**, wherein the conduit is adapted to transmit gas from the source of gas to the upper manifold via the lower manifold.

17. A gas burner assembly comprising:

a first sheet having an inner face and an outer face, the first sheet extending a vertical height between a top edge and a bottom edge and extending a longitudinal length between a first side edge and a second side edge opposite the first side edge, the first sheet being formed of an at least partially transparent material to form a central viewing window;

a second sheet having an inner face and an outer face, the second sheet extending a vertical height between a top edge and a bottom edge and extending a longitudinal length between a first side edge and a second side edge opposite the first side edge;

the first and second sheets being secured relative to one another such that the first and second sheets are separated by a gap that defines a substantially thin manifold between the inner faces of the first and second sheets, wherein an outlet from the substantially thin manifold is formed along the top edge of the first sheet;

a lateral framing member located along a first side edge of the first sheet;

an ignitor support member adapted to support an ignitor proximate to the outlet from the substantially thin manifold, wherein the ignitor support member is secured to a side of the lateral framing member; and

a conduit in communication with the substantially thin manifold, the conduit being adapted for connection to a source of gas.

18. The gas burner assembly of claim **17**, wherein the ignitor support member comprises means for mounting the ignitor proximate the outlet.

19. The gas burner assembly of claim **18**, wherein the means for mounting the ignitor proximate the outlet includes two horizontally extending portions.

20. The gas burner assembly of claim **17**, wherein the ignitor support member comprises a vertically extending portion and a horizontally extending portion.

21. The gas burner assembly of claim **20**, wherein the lateral framing member lies in a plane extending vertically and longitudinally, wherein the first sheet is on one side of that plane, and wherein the horizontal extending portion of the ignitor support member extends to the other side of that plane.

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